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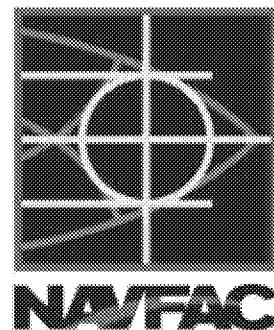
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**Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310**

**CONTRACT NO. N62473-10-D-0809
CTO No. 0002**

FINAL

**SURVEY UNIT 232 PROJECT REPORT
September 20, 2012**

DCN: RMAC-0809-0002-0092

**PARCEL C STORM DRAIN AND
SANITARY SEWER REMOVAL
HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA**

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DCN: RMAC-0809-0002-0092

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Attachment 4	Trench Unit RESRAD Report (on CD only)
Attachment 5	Response to Comments

ABBREVIATIONS AND ACRONYMS

ALARA	as low as reasonably achievable
AM	Action Memorandum
^{214}Bi	bismuth-214
^{137}Cs	cesium-137
DoD	Department of Defense
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
FSS	Final Status Survey
HPNS	Hunters Point Naval Shipyard
IR	Installation Restoration
keV	kiloelectron volt
MDL	method detection limit
mrem/y	millirems per year
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
^{226}Ra	radium-226
RASO	Radiological Affairs Support Office
ROC	radionuclide of concern
^{90}Sr	strontium-90
SUPR	Survey Unit Project Report
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-extractable	total extractable petroleum hydrocarbons
TPH-g	total petroleum hydrocarbons quantified as gasoline
TPH-mo	total petroleum hydrocarbons quantified as motor oil
TPH-purgeable	total purgeable petroleum hydrocarbons
VOC	volatile organic compound
VSP	Visual Sample Plan

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1.0 INTRODUCTION

1.1 PURPOSE

This Survey Unit Project Report (SUPR) documents the work performed in Survey Unit 232 (inclusive of the trench and the associated import fill material used as backfill). The work was conducted under the final Basewide Radiological Management Plan (TtEC 2012). This SUPR summarizes the scope, approach, and radiological surveys resulting from the removal of the storm drains and sanitary sewers located within Area 33 in Parcel C at Hunters Point Naval Shipyard (HPNS), San Francisco, California.

Information that was provided in the SUPRs Abstract (TtEC 2011) will be repeated only if there were exceptions to the information specific to Survey Unit 232.

1.2 BACKGROUND

Survey Unit 232 is the net sum of Trench Unit 232 and a volume of import fill material, which was used for backfill. There are 24 trench segments associated with Survey Unit 232. Thirteen of the trench segments are located within Installation Restoration (IR) Sites 28 and 29. Chemicals of concern associated with IR Sites 28 and 29 include metals, pesticides, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), total extractable petroleum hydrocarbons (TPH-extractable), total oil and grease, total petroleum hydrocarbons (TPH), total purgeable petroleum hydrocarbons (TPH-purgeable), TPH quantified as diesel (TPH-d), TPH quantified as gasoline (TPH-g), TPH quantified as motor oil (TPH-mo), and volatile organic compounds (VOCs). One of the trench segments was not found during the excavation. In addition, five manholes were removed from Trench Unit 232.

Survey Unit 232 is located in Parcel C within Area 33 as identified on Figure 1-1. Trench Unit 232 consists of three separate trench sections. The first trench section is located on C Street, just east of Building 203. The second section is located south of Building 281, in between Buildings 271 and 272. The last section is a small piece that also originates south of Building 281 and is located between Buildings 273 and 228. The footprint of Trench Unit 232 was 565 linear feet. The total surface area was 10,042.73 square feet (933 square meters) of actual excavated trench, in varying depths up to 11 feet below ground surface.

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2.0 RELEASE CRITERIA

Release criteria information for Survey Unit 232 is presented in Section 2.0 of the SUPRs Abstract (TtEC 2011). No additional radionuclides of concern (ROCs) were identified.

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3.0 FINAL STATUS SURVEYS

3.1 OBJECTIVE OF THE FINAL STATUS SURVEY

The objective of the Final Status Survey (FSS) was to demonstrate that identified residual radioactivity levels inside the excavated trench and within the import fill material used as backfill met the release criteria.

3.2 SURVEY UNIT

Survey Unit 232 is located within Area 33 and consists of only a trench survey unit. Survey Unit 232 is the sum of Trench Unit 232 and a volume of import fill material, which was used for backfill. There are 24 trench segments associated with Survey Unit 232. Thirteen of the trench segments are located within IR Sites 28 and 29. Chemicals of concern associated with IR Sites 28 and 29 include metals, pesticides, PCBs, PAHs, SVOCs, TPH-extractable, total oil and grease, TPH, TPH-purgeable, TPH-d, TPH-g, TPH-mo, and VOCs. One of the trench segments was not found during the excavation.

In addition, five manholes were removed from Trench Unit 232. A sediment sample was available and collected from two of the manholes associated with Trench Unit 232. Analytical results identified radium-226 (^{226}Ra) activity above the release criterion at 2.47 picocuries per gram (pCi/g). The contaminated manholes were disposed of as low-level radioactive waste.

3.2.1 Trench Survey Unit

Scan surveys and systematic sampling were performed in Trench Unit 232. Figure 3-1 shows the approximate systematic sampling locations and provides the lengths of piping segments and locally assigned identification for each trench segment. Trench Unit 232 had a total surface area of 933 square meters. Systematic postexcavation samples were collected after a grid was established using Visual Sample Plan (VSP).

No measurements above the investigation level were identified during the performance of gamma scans in Trench Unit 232. Therefore, no additional surveys or sampling was performed. The trench unit gamma scan ranges, investigation level, and static measurement values are provided in Attachment 1.

Because ^{226}Ra activity was identified inside one of the manholes, two biased samples were collected along the bottom of the trench in the area where the manhole was removed. None of the sample results identified activity above the release criterion for any ROC.

VSP was used to generate 18 systematic sample locations (samples 3 to 20) based on a random start point and a triangular grid. Each sample was analyzed at the on-site laboratory by gamma

spectroscopy for screening purposes in making time-critical radiological remediation decisions. None of the sample results identified activity above the release criterion for any ROC. These samples were then sent to the off-site laboratory for final release of the trench unit. A summary of the 18 systematic sample results is provided in Table 3-1.

TABLE 3-1

Class 1 Soil Measurements - Trench Unit 232

Sample No.	Date	Time	¹³⁷ Cs	Flag	Results (pCi/g)				²²⁶ Ra	Flag
					⁹⁰ Sr	Flag	MDL	≥MDL		
3	12/14/2011	11:00:00	0.005	U	0.024	0.024			0.538	J
4	12/14/2011	11:03:00	-0.008	U	0.049	0.049			0.429	J
5	12/14/2011	11:06:00	-0.017	U	0.048	0.048			0.269	J
6	12/14/2011	11:09:00	-0.015	U	0.038	0.038			0.592	J
7	12/14/2011	11:10:00	0.008	U	0.046	0.046			0.394	J
8	12/14/2011	11:14:00	0.006	U	0.046	0.046			0.483	J
9	12/14/2011	11:17:00	-0.004	U	0.037	0.037			0.258	J
10	12/14/2011	11:20:00	-0.007	U	0.045	0.045			0.297	J
11	12/14/2011	11:23:00	0.007	U	0.049	0.049			0.739	
12	12/14/2011	11:26:00	0.019	U	0.037	0.037			0.512	J
13	12/14/2011	11:29:00	0.022	U	0.044	0.044			0.851	
14	12/14/2011	11:33:00	0.000	U	0.048	0.048			0.548	J
15	12/14/2011	11:36:00	0.018	U	0.041	0.041	0.113	U	0.141	0.141
16	12/14/2011	11:39:00	0.003	U	0.061	0.061			0.480	J
17	12/14/2011	11:42:00	0.016	U	0.046	0.046			0.565	J
18	12/14/2011	11:45:00	0.013	U	0.047	0.047	-0.004	U	0.135	0.135
19	12/14/2011	11:48:00	0.055	J	0.040	0.055			0.869	
20	12/14/2011	11:51:00	0.007	U	0.044	0.044			0.581	J
					mean	0.045			0.138	0.570
					std dev	0.008			0.004	0.240
					median	0.046			0.138	0.543

Notes:

Information concerning flags associated with the on-site laboratory data can be found in Section 4.3 and a discussion of uncertainty can be found in Section 4.5 of the SUPRs Abstract (TiEC 2011).

Abbreviations and Acronyms:

¹³⁷Cs – cesium-137

MDL – method detection limit

pCi/g – picocuries per gram

²²⁶Ra – radium-226

⁹⁰Sr – strontium-90

std dev – standard deviation

SUPR – Survey Unit Project Report

The cesium-137 (¹³⁷Cs) results show 17 of the 18 values less than the reported method detection limit (MDL) and had a “U” flag identified that will require the values to be considered less than the MDL. The other sample had a “J” qualifier flag associated with the activity reported. The ²²⁶Ra results show all 18 values greater than the MDL. In addition, 14 of the values had a “J” qualifier flag associated with the activity reported.

The “U” flag indicates that “The result is less than the sample detection limit.” The “J” flag indicates that “The result is greater than sample detection limit but less than stated reporting limit.” These flag indications are printed on the off-site Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) accredited laboratory summary reports provided in Attachment 2. Section 4.3 of the SUPRs Abstract (TtEC 2011) also discusses these flags in more detail.

Table 3-1 also contains a summary of the analytical results for radionuclides analyzed by methods other than gamma spectroscopy. The strontium-90 (^{90}Sr) results indicate that for both samples the results are less than the MDL, as designated by the “U” qualifier flag.

Summary statistics (standard deviation, median, and mean activity greater than or equal to the MDL) are calculated and reported at the bottom of Table 3-1 for all radioanalytical results.

Complete off-site DoD ELAP accredited laboratory analytical reports for each Trench Unit 232 soil sample, including biased and duplicate samples, are presented in Attachment 2.

3.2.2 Import Fill Material

Approximately 1,033 cubic yards of import fill material was required to complete backfilling activities. Import fill sample information for Survey Unit 232 is presented in Section 3.2.4 of the SUPRs Abstract (TtEC 2011).

3.3 REFERENCE AREA

Reference area sample information for Survey Unit 232 is presented in Section 3.3 of the SUPRs Abstract (TtEC 2011).

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4.0 LABORATORY ANALYSIS

Information concerning laboratory analysis is presented in Section 4.0 of the SUPRs Abstract (TtEC 2011). Specifically, information concerning flags associated with the off-site laboratory data can be found in Section 4.3 and discussion about uncertainty can be found in Section 4.5 of the SUPRs Abstract (TtEC 2011). The on-site laboratory results were used for screening purposes only for making radiological remediation decisions for time-critical actions. The on-site laboratory results are purposely biased conservatively high, which may have resulted in some remediation of soil that might not have occurred if the results from the off-site DoD ELAP accredited laboratory had been used. All definitive data for the final systematic samples are from the DoD ELAP accredited off-site laboratory. The minimum detectable activities and MDLs for both the on-site and off-site laboratory were well below the release criteria for the ROCs.

Results of the on-site and off-site laboratory data were reviewed to ensure that the activities for all ROCs were below the release criteria. These data were then evaluated by the Laboratory Manager. The on-site laboratory analyzed the samples directly for ^{226}Ra using the U.S. Environmental Protection Agency (EPA) 901.1 MOD method and calculating the ^{226}Ra activity from the 3.6 percent abundant 186.2 kiloelectron-volt (keV) gamma spectrum line for ^{226}Ra . The off-site DoD ELAP accredited laboratory counted the samples using the EPA 901.1 MOD method, and the ^{226}Ra results were calculated and reported from the 46.09 percent abundant 609.31 keV gamma spectrum line of bismuth-214 (^{214}Bi) after an in-growth period of greater than 21 days to allow the ^{214}Bi to approach secular equilibrium with ^{226}Ra .

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5.0 STATISTICAL TESTS

Because all sample results in Table 3-1 were less than the release criteria for the ROCs, there is no basis for performing statistical tests for Trench Unit 232 per Section 8.2.2.1 of the Multi-Agency Radiation Survey and Site Investigation Manual (DoD et al. 2000).

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6.0 DOSE MODELING

6.1 MODELING INPUT PARAMETERS USING LARGER OF MDL OR REPORTED ACTIVITY

Table 6-1 shows the mean concentrations of ^{137}Cs , ^{226}Ra , and ^{90}Sr from using the actual activity and replacing it with the MDL value if the reported activity was less than the MDL. The activity used to model ^{226}Ra is based on the isotopic net concentration (with background ^{226}Ra subtracted). No background is subtracted from the ^{137}Cs or ^{90}Sr values, as these radionuclides are not naturally occurring or expected at drain piping depths from global fallout from nuclear weapons testing.

Table 6-1 also provides the average net concentrations of residual radioactivity of material used as backfill, as well as the trench unit average net concentrations of residual radioactivity.

TABLE 6-1
**MODELING PARAMETERS USING LARGER OF
MDL OR REPORTED ACTIVITY CONCENTRATIONS**

Survey Unit 232	Residual Activity \geq MDL (pCi/g)			Volume of Material (yd ³)	Percent of Fill	Weighted Sum (pCi/g) (Backfill)			
	^{137}Cs	^{90}Sr	^{226}Ra			^{137}Cs	^{90}Sr	^{226}Ra	
Jericho Import Fill	0.040	0.152	0.396	1,033	100.00%	0.040	0.152	0.396	
Backfill Material Average Activity	0.040	0.152	0.396	Weighted Sum Activity			0.040	0.152	0.396
Trench Unit Average Activity	0.045	0.138	0.570	Backfill Net Activity			0.040	0.152	-0.229
Reference Area Average Activity	0.038	0.194	0.625	Trench Unit Net Activity			0.045	0.138	-0.055

Abbreviations and Acronyms:

^{137}Cs – cesium-137

MDL – method detection limit

pCi/g – picocuries per gram

^{226}Ra – radium-226

^{90}Sr – strontium-90

yd³ – cubic yard

Using the data provided in Table 6-1, the average net concentrations of residual radioactivity of material used as backfill in Survey Unit 232 were 0.040 pCi/g for ^{137}Cs , 0.152 pCi/g for ^{90}Sr , and -0.229 pCi/g for ^{226}Ra . The trench unit average net concentrations of residual radioactivity were 0.045 pCi/g for ^{137}Cs , 0.138 pCi/g for ^{90}Sr , and -0.055 pCi/g for ^{226}Ra .

6.2 DOSE AND RISK MODELING RESULTS

Modeling resulted in a net residual dose of 0.6535 millirem per year (mrem/y) with an increased cancer risk of 8.551×10^{-6} for the backfill material and 0.6104 mrem/y with an increased cancer risk of 8.043×10^{-6} for the trench unit.

Dose and risk modeling results for the backfill material and trench unit are summarized in Table 6-2. Based on these results, no further dose modeling is determined to be reasonable or prudent. The RESRAD reports can be found in Attachments 3 and 4.

TABLE 6-2

DOSE AND RISK MODELING SUMMARY

Dose and Risk Modeling Summary - Trench Unit 232										
Survey Unit	Modeling Parameter	Survey Area	Average Activity (pCi/g)			Net Activity (pCi/g)			Dose (mrem/y)	Cancer Risk
			^{137}Cs	^{90}Sr	^{226}Ra	^{137}Cs	^{90}Sr	^{226}Ra		
Backfill	Activity \geq MDL	1,033 cy	0.040	0.152	0.396	0.040	0.152	-0.229	0.6535	8.551E-06
Trench Unit	Activity \geq MDL	933 m ²	0.045	0.138	0.570	0.045	0.138	-0.055	0.6104	8.043E-06

Abbreviations and Acronyms:

^{137}Cs – cesium-137

cy – cubic yard

m² – square meter

MDL – method detection limit

mrem/y – millirems per year

pCi/g – picocuries per gram

^{226}Ra – radium-226

^{90}Sr – strontium-90

7.0 RECOMMENDATION OF FINAL UNRESTRICTED RELEASE

7.1 RADIONUCLIDE-SPECIFIC RELEASE CRITERIA

The radionuclide-specific release criteria used for the FSS are equivalent to the ROC release criteria established in the final Base-wide Radiological Removal Action, Action Memorandum – Revision 2006 (AM) (DON 2006). The radionuclide-specific release criteria are presented in terms of mass activity concentrations and refer to average levels of radiation or radioactivity above background levels.

7.2 RADIONUCLIDE-SPECIFIC RELEASE CRITERIA MODELING

Radionuclide-specific release criteria were obtained from the AM and were then modeled using RESRAD Version 6.3, based on the 25 mrem/y total effective dose equivalent or were otherwise risk based; the final doses are all less than this 25 mrem/y release criterion. The model for the critical group was based on default RESRAD Version 6.5 parameters. This model shows that with all the radionuclide-specific release criteria combined (the ROCs), the dose to the average member of the critical group for this trench unit would be 17.95 mrem/y.

7.3 AS LOW AS REASONABLY ACHIEVABLE

As low as reasonably achievable (ALARA) is a philosophy of striving for excellence in the practice of health physics and is an important aspect of radiation-safety regulations. The National Council on Radiation Protection and Measurements has stated, “ALARA is simply the continuation of good radiation-protection programs and practices which traditionally have been effective in keeping the average and individual exposures for monitored workers well below the limits” (NCRP 1993). The application of ALARA clearly includes the consideration of economic and social factors, and thus will inherently be different for different sources or facilities.

The ALARA concept is founded on the professional judgment of radiation-safety managers and personnel and is not, therefore, able to be used as a measure as to whether or not a particular radiation-safety program is adequate in comparison with other programs. Additionally, the ALARA concept does not provide a numerical limit below which the ALARA concept is achieved.

7.4 ENVIRONMENTAL ALARA PROCESS

This section describes the steps taken to implement the environmental ALARA policy:

- Identification of Potential Radiological Impacts
- Review of Radiological Impacts

- Performance of Qualitative ALARA Analyses
- Performance of Quantitative ALARA Analyses

7.4.1 Identification of Potential Radiological Impacts

Each new radiological operation was subjected to ALARA reviews before work began to ensure that radiation exposures to workers, the public, and the environment met ALARA principles. ALARA reviews were conducted for all operations, practices, and procedures that have potential for individual or collective doses to workers. Reviews culminated in changes or additions to work planning documents, standard operating procedures, and radiological work permits.

These documents were used to identify activities that have potential for radiological environmental impacts and could require environmental ALARA analysis. If a radiological impact was identified that could impact the environment significantly, the Radiation Safety Officer communicated the impact to the work staff and the Radiological Affairs Support Office (RASO).

7.4.2 Review of Radiological Impacts

Radiological impacts to the environment, workers, and the public from field operations were assessed for compliance with ALARA principles. Results from radiological survey activities, and air, soil, sediment, and water samples were used to assess the radiological impacts of HPNS activities.

Environmental radiological impacts from radiological activities were determined using nine methods: 1) air monitoring stations located around the excavation site perimeter to track radiological impacts; several air-sampling devices monitor radionuclides in the ambient air, and the results of this monitoring are provided to the RASO on a monthly basis; 2) field monitoring and sampling to identify areas requiring additional remediation; 3) remediation of contaminated areas at or above the release criteria; 4) control of radiologically impacted areas and work sites; 5) frisking of personnel and examining equipment leaving a radiologically controlled area; 6) use of release criteria that equate to dose and risk; 7) review of historical radiological operations to allow complete investigation of all areas of radiological concern; 8) characterization of radiologically impacted sites to ensure complete removal of radioactive material above the release criteria; and 9) dosimetry worn by personnel to measure time-averaged doses from gamma radiation.

7.4.3 Performance of Qualitative ALARA Analyses

Laboratory analyses were performed for 19 different isotopes to ensure that any possible radioactive contamination has been identified. After each excavation was completed, the qualitative radiological impacts from operations were evaluated by performing a dose and risk

assessment. The results of analysis and assessments are provided to the RASO and regulatory agencies for review.

7.4.4 Performance of Quantitative ALARA Analyses

Based on qualitative ALARA analyses, excavation projects that could cause the potential dose to the public to exceed 100 millirems (individual) or 10 person-rems (collective) are subjected to quantitative ALARA analyses using the steps described below. To date, no operations at HPNS have resulted in an individual dose to the public greater than 100 millirems or a collective dose greater than 10 person-rems.

Quantitative ALARA analyses include societal, technological, economic, and public policy considerations. In addition, these ALARA analyses consider Nuclear Regulatory Commission guidance for performing the following environmental ALARA assessments:

- Identification of possible radiation protection systems, such as alternative operating methods or controls, that is reasonably achievable. The options range from the most rudimentary (base case) to the most technologically sophisticated systems.
- Quantification of exposures and doses to workers and the public in the vicinity of the work through air monitoring and dosimetry.
- Quantification of the economic factors, including the costs of purchasing, installing, operating, and maintaining the radiological equipment, and the potential health effects associated with the exposure of people and any other direct or indirect cost resulting from exposures to radiation during investigations and/or remediations.
- Identification and estimation of other health and non-health detriments and benefits, such as equipment loss and accidents.
- Evaluation of process alternatives using a quantitative cost-benefit analysis, when possible. When evaluations included assumptions, judgments, and limitations that could be quantified, and potential doses were well below the dose limit, qualitative analyses were used with full documentation.
- Implementation of the ALARA principles and monitoring of the results.

The following specific factors were used in performing a quantitative ALARA analysis:

- Dose to workers, the public, and the environment before and during work processes
- Residual dose to the local population
- Applicable alternative processes (treatments, operating methods, or controls) for site investigations or remediations
- Costs for each alternative evaluated
- Societal and environmental (positive and negative) impacts associated with alternatives

7.5 ALARA ANALYSIS RESULTS

Based on recent estimates of dose to the public from HPNS operations, only qualitative ALARA analyses were required. Much of the data and analyses used for environmental ALARA evaluations were developed as part of the routine work processes.

Qualitative ALARA analyses resulted in no gamma measurements above the investigation levels; none of the sample results identified activity above the release criteria for any ROC; no air sampling results were above 10 percent of the derived air concentration; and no personnel dosimetry badges processed identified gamma doses above background levels.

7.6 RECOMMENDATIONS

Dose modeling using RESRAD determined that the potential dose of Survey Unit 232 due to activity concentrations greater than or equal to the MDL has been determined to be 0.6535 mrem/y with an increased cancer risk of 8.551×10^{-6} as shown in Table 6-2. These results are less than the Nuclear Regulatory Commission criterion of 25 mrem/y with an increased cancer risk that falls within the EPA risk management range of 10^{-4} to 10^{-6} , which supports free release. Therefore, no further action is recommended for Survey Unit 232.

8.0 REFERENCES

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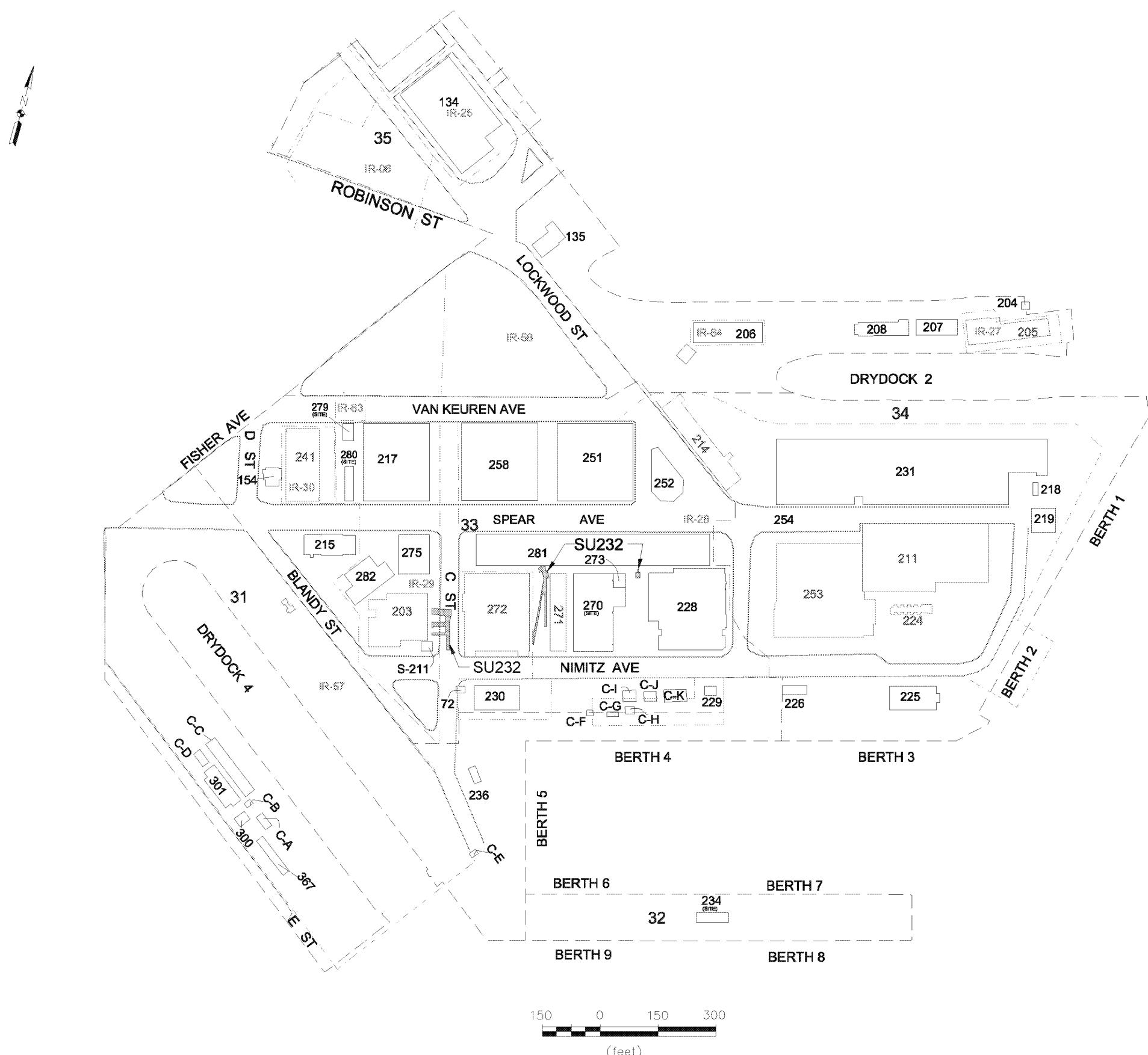
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FIGURES

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**BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA**

SURVEY UNIT 232 PROJECT REPORT

FIGURE 1-1

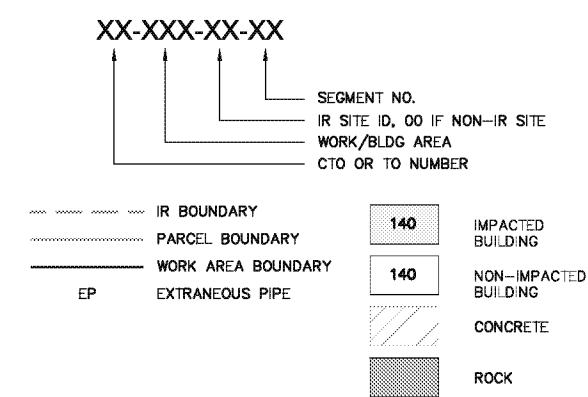
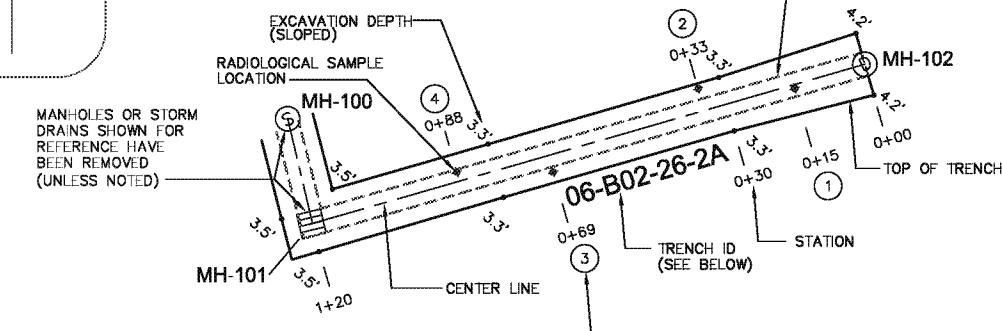
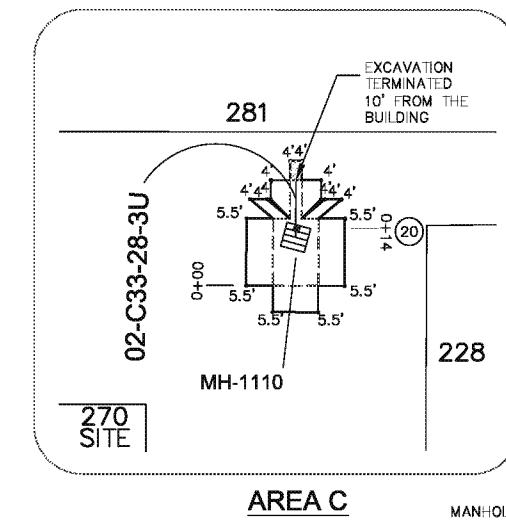
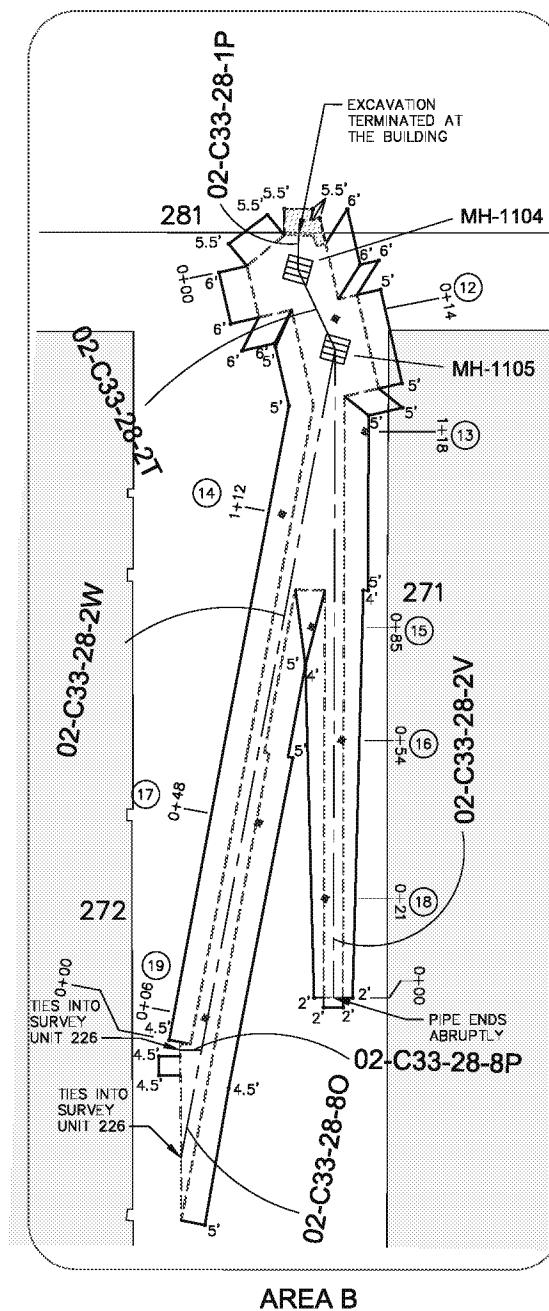
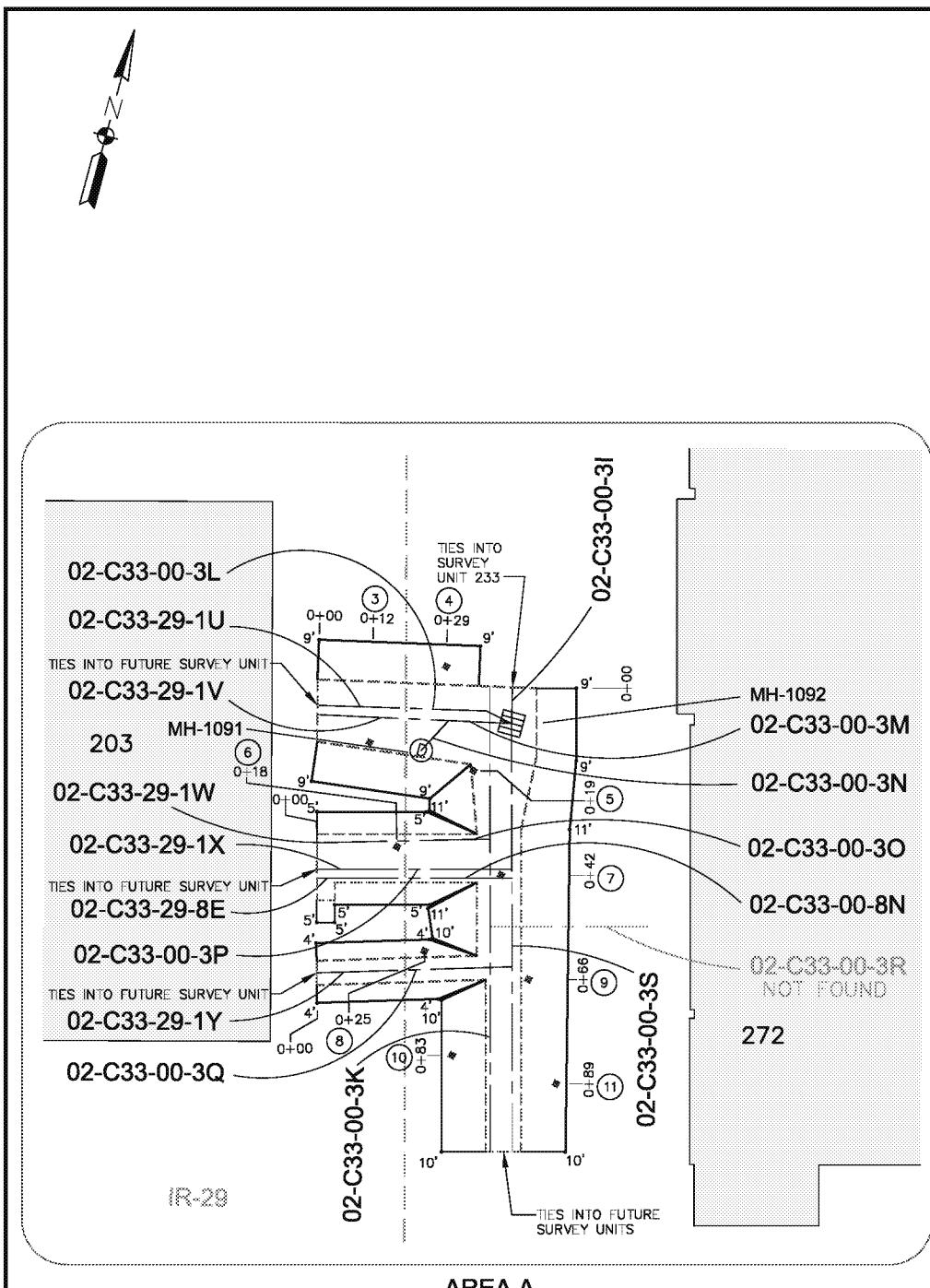
PARCEL C SURVEY UNIT KEY PLAN

HUNTERS POINT NAVAL SHIPYARD, SAN FRANCISCO, CA

REVISION:
AUTHOR: A.CRABTREE
PROJECT NO:
FILE: SEE BELOW



TETRA TECH EC, INC.



SURFACE AREA = 933 SQUARE METERS
TOTAL LENGTH OF TRENCH = 565 LINEAR FEET

**BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA**

SURVEY UNIT 232 PROJECT REPORT

FIGURE 3-1

PARCEL C SURVEY UNIT 232, AREA 33

HUNTERS POINT NAVAL SHIPYARD, SAN FRANCISCO, CA

REVISION: - AUTHOR: A.CRABTREE PROJECT NO: FILE: SEE BELOW	
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ATTACHMENT 1

TRENCH UNIT 232

RADIATION/CONTAMINATION SURVEY FORM

(on CD only)

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RADIATION/CONTAMINATION SURVEY SUPPLEMENT

Date:	Time:	INSTRUMENTATION USED						
		Model Inst/Det.	Serial Number	Calibration Due Date	Instrument % Efficiency	Total % Efficiency	MDC/MDA + (dpm/100cm ²)	Background + (dpm/100cm ²)
12/14/2011	08:30							
Survey Number: HPS-SU-232								
Location: Parcel C								
Surveyor: J. Cunningham								
Reviewed By: (Print & Sign)		2350-1 44-10	117563 215116	6/8/2012				
Isotopes of Concern: ²²⁶ Ra ⁹⁰ Sr ¹³⁷ Cs								
Description of drawing: Trench Scan Survey								
<p>AREA A</p> <p>AREA B</p> <p>AREA C</p> <p>20 0 20 40 (feet)</p>								
Comments: Scan range for 2350-1 Instrument is 3.86 - 7.55 Kcpm 3 sigma investigation level for 2350-1 Instrument is 8028 cpm Picture is representative of material surveyed.				denotes swipe location or fixed α/β readings # denotes G/A radiation readings #/# denotes contact / 1 meter radiation readings. * denotes highest radiation reading on contact LAW denotes large area masslinn wipe △ denotes static location. + Unless Otherwise Noted All readings in μR/hr unless otherwise noted K = 1000				

RADIATION/CONTAMINATION SURVEY SUPPLEMENT

SURVEY NUMBER: HPS-SU-232								
SURVEYOR: J. Cunningham			LOCATION: Parcel C					
Location	Exposure Rate (μ R/hr)		Fixed + Removable (NET)			Removable (NET)		Comments
	Contact	1 Meter	Gamma (cpm)	Alpha dpm/100cm ²	Beta/Gamma dpm/100cm ²	Alpha dpm/100cm ²	Beta/Gamma dpm/100cm ²	
3		5586						
4		5471						
5		5502						
6		5666						
7		5477						
8		5606						
9		5551						
10		5720						
11		5611						
12		5645						
13		5502						
14		5831						
15		5517						
16		5693						
17		5587						
18		5519						
19		5606						
20		5733						
Reviewer:						Date:		

ATTACHMENT 2

LABORATORY ANALYSIS REPORTS
FOR TRENCH UNIT 232
(on CD only)

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TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-001

Sample Description: Parcel C

Detector:	HPGe #12 51-TP32743A	Spectrum ID:	12_20111122_016
Contract:	Tetra Tech HPS	Sample Type:	SAMPLE
Unit Number:	232	Matrix:	S
Sample Time:	11/11/2011 11:40	Live Time:	2700 sec
Acquisition Time:	11/22/2011 19:35:12	Real Time:	2701 sec
Analysis Time:	11/22/2011 20:20	Dead Time:	0.05 %
Analysis Quantity:	3.170E+02 g		

Efficiency: HPGe #12 Tuna Can Soil Solid 83491-918

Efficiency Cal Date: 2/1/2011 09:56

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		7.191E-01	19.25	1.384E-01	1.471E-01	1.551E-02
Am-241	#AB	-9.528E-03	2658.00	2.533E-01	2.533E-01	2.081E-01
Bi-212	#AB	1.609E-01	143.20	2.304E-01	2.307E-01	1.730E-01
Bi-214		5.103E-01	17.53	8.947E-02	9.574E-02	2.268E-02
Co-60	#	7.242E-03	206.00	1.492E-02	1.492E-02	5.368E-03
Cs-137	#AB	3.903E-03	793.50	3.097E-02	3.097E-02	2.513E-02
Eu-152	#AB	-5.345E-04	12170.00	6.506E-02	6.506E-02	5.355E-02
Eu-154	#AB	-2.593E-02	366.00	9.490E-02	9.492E-02	7.502E-02
K-40		1.064E+01	9.70	1.032E+00	1.273E+00	5.831E-02
Pa-234	#AB	5.318E-03	2918.00	1.552E-01	1.552E-01	1.271E-01
Pb-210	#	0.0000E+00	708.30	1.805E+00	1.805E+00	0.0000E+00
Pb-212		6.564E-01	12.93	8.490E-02	9.861E-02	3.347E-02
Pb-214		5.750E-01	18.06	1.038E-01	1.118E-01	3.853E-02
Ra-226		1.377E+00	42.14	5.803E-01	5.896E-01	3.934E-01
Th-230	#	1.186E+01	107.00	1.268E+01	1.284E+01	9.697E+00
Th-234		1.364E+00	39.43	5.379E-01	5.535E-01	2.851E-01
Tl-208		2.389E-01	18.82	4.496E-02	4.768E-02	1.101E-02
U-235	AB	1.919E-02	233.90	4.489E-02	4.491E-02	3.604E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 2.813E+01

Analyst: Andrew Alexander

Reviewer: Philip Smith
Review Date: 11/23/2011 00:31

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-002

Sample Description: Parcel C

Detector: HPGe #11 51-TP32744A Spectrum ID: 11_20111122_016
 Contract: Tetra Tech HPS Sample Type: SAMPLE
 Unit Number: 232 Matrix: S
 Sample Time: 11/11/2011 11:45 Live Time: 2700 sec
 Acquisition Time: 11/22/2011 19:34:17 Real Time: 2704 sec
 Analysis Time: 11/22/2011 20:19 Dead Time: 0.14 %
 Analysis Quantity: 3.260E+02 g

Efficiency: HPGe #11 Tuna Can Soil Solid 83491-918
 Efficiency Cal Date: 1/28/2011 17:38
 Library: GenericAnalysis.lib
 Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		8.013E-01	19.67	1.576E-01	1.671E-01	3.241E-02
Am-241	#AB	1.571E-02	1416.00	2.225E-01	2.225E-01	1.824E-01
Bi-212	#	4.204E-01	54.95	2.310E-01	2.328E-01	1.452E-01
Bi-214		5.388E-01	17.63	9.497E-02	1.016E-01	2.537E-02
Co-60	#AB	1.647E-02	174.70	2.876E-02	2.878E-02	2.150E-02
Cs-137	#AB	-3.925E-03	732.00	2.873E-02	2.873E-02	2.327E-02
Eu-152	#AB	-1.147E-02	614.40	7.045E-02	7.045E-02	5.711E-02
Eu-154	#AB	-2.910E-02	292.90	8.523E-02	8.525E-02	6.637E-02
K-40		1.112E+01	9.83	1.092E+00	1.342E+00	1.418E-01
Pa-234	#AB	-6.607E-03	2036.00	1.345E-01	1.345E-01	1.098E-01
Pb-210	#AB	0.0000E+00	2000.00	2.437E+00	2.438E+00	7.747E+00
Pb-212		6.613E-01	12.77	8.443E-02	9.839E-02	3.109E-02
Pb-214		5.477E-01	17.41	9.538E-02	1.032E-01	3.112E-02
Ra-226		8.758E-01	62.08	5.437E-01	5.477E-01	3.946E-01
Th-230	#AB	-6.681E+00	209.20	1.398E+01	1.402E+01	1.119E+01
Th-234	#AB	3.741E-01	142.90	5.344E-01	5.356E-01	4.221E-01
Tl-208		2.576E-01	21.20	5.462E-02	5.724E-02	1.862E-02
U-235		3.854E-02	101.30	3.906E-02	3.917E-02	3.006E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.566E+01

Analyst: Andrew Alexander

Reviewer: Philip Smith
Review Date: 11/23/2011 00:30

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-003

Sample Description: Parcel C

Detector: HPGe #11 51-TP32744A Spectrum ID: 11_20120106_006
 Contract: Tetra Tech HPS Sample Type: SAMPLE
 Unit Number: 232 Matrix: S
 Sample Time: 12/14/2011 11:00 Live Time: 2700 sec
 Acquisition Time: 1/6/2012 10:09:44 Real Time: 2703 sec
 Analysis Time: 1/6/2012 10:54 Dead Time: 0.10 %
 Analysis Quantity: 3.200E+02 g

Efficiency: HPGe #11 Tuna Can Soil Solid 85625-918
 Efficiency Cal Date: 1/5/2012 11:14
 Library: GenericAnalysis.lib
 Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		7.752E-01	18.18	1.409E-01	1.503E-01	1.493E-02
Am-241	#AB	1.187E-01	162.10	1.923E-01	1.926E-01	1.509E-01
Bi-212	#	2.078E-01	118.70	2.467E-01	2.471E-01	1.837E-01
Bi-214		4.288E-01	20.38	8.739E-02	9.196E-02	2.887E-02
Co-60	#AB	-6.822E-03	8448.00	5.764E-01	5.764E-01	3.116E-02
Cs-137	#AB	-1.433E-03	2178.00	3.121E-02	3.121E-02	2.557E-02
Eu-152	AB	-1.122E-03	5901.00	6.623E-02	6.623E-02	5.446E-02
Eu-154	#AB	-8.725E-03	1175.00	1.025E-01	1.026E-01	8.353E-02
K-40		1.380E+01	9.34	1.289E+00	1.606E+00	2.175E-01
Pa-234	#AB	-4.563E-02	432.10	1.972E-01	1.972E-01	1.577E-01
Pb-210	#AB	-7.701E+00	139.00	1.070E+01	1.073E+01	8.467E+00
Pb-212		5.421E-01	15.56	8.437E-02	9.376E-02	3.523E-02
Pb-214		4.226E-01	20.51	8.667E-02	9.136E-02	3.348E-02
Ra-226	#AB	3.815E-01	147.30	5.620E-01	5.628E-01	4.406E-01
Th-230	#AB	-4.718E+00	288.90	1.363E+01	1.363E+01	1.097E+01
Th-234	#	6.149E-01	80.95	4.978E-01	5.008E-01	3.768E-01
Tl-208		2.409E-01	21.06	5.074E-02	5.320E-02	1.488E-02
U-235	#AB	2.459E-02	150.40	3.698E-02	3.702E-02	2.900E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.756E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:44

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-004

Sample Description: Parcel C

Detector:	HPGe #12 51-TP32743A	Spectrum ID:	12_20120106_006
Contract:	Tetra Tech HPS	Sample Type:	SAMPLE
Unit Number:	232	Matrix:	S
Sample Time:	12/14/2011 11:03	Live Time:	2700 sec
Acquisition Time:	1/6/2012 10:10:29	Real Time:	2703 sec
Analysis Time:	1/6/2012 10:55	Dead Time:	0.10 %
Analysis Quantity:	3.290E+02 g		

Efficiency: HPGe #12 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 12/23/2011 17:52

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		2.381E-01	48.07	1.144E-01	1.156E-01	6.944E-02
Am-241	#AB	-9.677E-03	2482.00	2.401E-01	2.401E-01	1.972E-01
Bi-212	#	1.949E-01	123.10	2.399E-01	2.402E-01	1.790E-01
Bi-214	AB	-3.608E-02	656.80	2.370E-01	2.370E-01	4.011E-02
Co-60	#AB	-2.589E-03	1350.00	3.494E-02	3.494E-02	2.851E-02
Cs-137	#AB	-1.210E-02	254.30	3.077E-02	3.078E-02	2.420E-02
Eu-152	#AB	6.261E-04	9965.00	6.240E-02	6.240E-02	5.134E-02
Eu-154	#AB	1.910E-02	467.10	8.920E-02	8.920E-02	7.112E-02
K-40		2.134E+01	6.82	1.455E+00	2.076E+00	2.440E-01
Pa-234	#AB	2.648E-02	687.50	1.820E-01	1.820E-01	1.471E-01
Pb-210	#AB	1.289E+00	738.40	9.516E+00	9.516E+00	7.742E+00
Pb-212		3.610E-01	18.99	6.854E-02	7.375E-02	3.103E-02
Pb-214		4.372E-01	20.78	9.086E-02	9.565E-02	3.600E-02
Ra-226	#	7.720E-01	68.97	5.325E-01	5.357E-01	3.906E-01
Th-230	#AB	-5.541E+00	252.70	1.400E+01	1.401E+01	1.120E+01
Th-234	#	5.017E-01	89.81	4.506E-01	4.528E-01	3.451E-01
Tl-208		1.409E-01	26.91	3.792E-02	3.906E-02	1.244E-02
U-235	#	4.769E-02	77.10	3.677E-02	3.695E-02	2.745E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 2.537E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:50

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-005

Sample Description: Parcel C

Detector:	HPGe #10 51-TP42231A	Spectrum ID:	10_20120106_007
Contract:	Tetra Tech HPS	Sample Type:	SAMPLE
Unit Number:	232	Matrix:	S
Sample Time:	12/14/2011 11:06	Live Time:	2700 sec
Acquisition Time:	1/6/2012 10:55:08	Real Time:	2704 sec
Analysis Time:	1/6/2012 11:40	Dead Time:	0.16 %
Analysis Quantity:	3.160E+02 g		

Efficiency: HPGe #10 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 1/5/2012 10:45

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		2.420E-01	57.26	1.386E-01	1.395E-01	9.007E-02
Am-241	#AB	1.588E-01	282.20	4.481E-01	4.484E-01	3.568E-01
Bi-212	#	2.761E-01	87.29	2.410E-01	2.418E-01	1.665E-01
Bi-214	#	1.668E-01	46.58	7.770E-02	7.849E-02	5.466E-02
Co-60	#AB	-6.874E-03	624.30	4.291E-02	4.292E-02	3.465E-02
Cs-137	#AB	-9.789E-03	326.20	3.193E-02	3.194E-02	2.526E-02
Eu-152	#AB	0.000E+00	2000.00	7.180E-02	7.180E-02	7.438E-02
Eu-154	#AB	3.087E-02	400.80	1.237E-01	1.237E-01	9.861E-02
K-40		2.238E+01	7.58	1.696E+00	2.300E+00	3.247E-01
Pa-234	#AB	0.000E+00	2000.00	2.831E-02	2.831E-02	2.280E-01
Pb-210	#AB	1.415E+01	289.30	4.093E+01	4.095E+01	3.257E+01
Pb-212		4.148E-01	20.07	8.325E-02	8.894E-02	3.597E-02
Pb-214		4.259E-01	23.81	1.014E-01	1.055E-01	4.257E-02
Ra-226		8.014E-01	69.40	5.562E-01	5.595E-01	4.015E-01
Th-230	#AB	2.035E-01	10190.00	2.074E+01	2.074E+01	1.707E+01
Th-234	#	4.244E-01	128.40	5.447E-01	5.460E-01	4.181E-01
Tl-208	#	1.072E-01	35.90	3.850E-02	3.915E-02	2.172E-02
U-235	AB	5.204E-03	754.40	3.926E-02	3.926E-02	3.271E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 3.978E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:40

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-006

Sample Description: Parcel C

Detector: HPGe #11 51-TP32744A Spectrum ID: 11_20120106_007
 Contract: Tetra Tech HPS Sample Type: SAMPLE
 Unit Number: 232 Matrix: S
 Sample Time: 12/14/2011 11:09 Live Time: 2700 sec
 Acquisition Time: 1/6/2012 10:56:27 Real Time: 2703 sec
 Analysis Time: 1/6/2012 11:41 Dead Time: 0.10 %
 Analysis Quantity: 3.460E+02 g

Efficiency: HPGe #11 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 1/5/2012 11:14

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228	#	2.882E-01	36.58	1.054E-01	1.072E-01	5.393E-02
Am-241	#AB	-4.458E-02	371.90	1.658E-01	1.658E-01	1.336E-01
Bi-212	#AB	1.160E-01	172.90	2.005E-01	2.007E-01	1.529E-01
Bi-214	#	2.002E-01	34.51	6.910E-02	7.038E-02	4.302E-02
Co-60	#AB	-5.559E-03	4000.00	2.224E-01	2.224E-01	7.921E-03
Cs-137	#AB	1.186E-02	209.10	2.479E-02	2.480E-02	1.910E-02
Eu-152	#AB	-1.409E-02	483.80	6.816E-02	6.816E-02	5.501E-02
Eu-154	#AB	0.000E+00	2000.00	4.675E-02	4.675E-02	3.851E-02
K-40		1.358E+01	8.83	1.199E+00	1.525E+00	1.860E-01
Pa-234	#AB	0.000E+00	2000.00	4.481E-02	4.481E-02	2.610E-02
Pb-210	#AB	1.645E+00	359.00	5.906E+00	5.908E+00	4.741E+00
Pb-212		3.526E-01	18.01	6.351E-02	6.886E-02	2.754E-02
Pb-214		3.691E-01	21.07	7.777E-02	8.177E-02	3.038E-02
Ra-226	#AB	3.863E-01	141.00	5.447E-01	5.454E-01	4.271E-01
Th-230	#AB	-4.337E+00	277.50	1.204E+01	1.204E+01	9.668E+00
Th-234	#AB	2.847E-02	1148.00	3.267E-01	3.267E-01	2.671E-01
Tl-208	#	8.919E-02	34.55	3.081E-02	3.138E-02	1.700E-02
U-235	#AB	1.867E-02	194.40	3.628E-02	3.631E-02	2.885E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.708E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:44

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-007

Sample Description: Parcel C

Detector: HPGe #7 50-TP32731A	Spectrum ID: 7_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:12	Live Time: 2700 sec
Acquisition Time: 1/6/2012 10:51:02	Real Time: 2703 sec
Analysis Time: 1/6/2012 11:36	Dead Time: 0.11 %
Analysis Quantity: 3.070E+02 g	

Efficiency: HPGe #7 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 12/19/2011 13:07

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		2.290E-01	51.99	1.191E-01	1.201E-01	6.732E-02
Am-241	#AB	4.494E-02	789.20	3.547E-01	3.547E-01	2.886E-01
Bi-212	#AB	1.223E-01	217.20	2.657E-01	2.658E-01	2.054E-01
Bi-214		2.925E-01	25.71	7.520E-02	7.770E-02	1.767E-02
Co-60	#AB	-8.543E-03	551.90	4.715E-02	4.715E-02	3.798E-02
Cs-137	#AB	-1.383E-03	2601.00	3.598E-02	3.598E-02	2.950E-02
Eu-152	#	5.554E-02	123.80	6.877E-02	6.888E-02	5.034E-02
Eu-154	#AB	0.000E+00	2000.00	9.369E-02	9.369E-02	1.263E-01
K-40		2.050E+01	8.34	1.711E+00	2.225E+00	3.626E-01
Pa-234	#AB	-8.364E-02	259.80	2.173E-01	2.174E-01	1.689E-01
Pb-210	#AB	-6.094E+00	435.40	2.654E+01	2.654E+01	2.144E+01
Pb-212		3.255E-01	24.98	8.131E-02	8.494E-02	3.795E-02
Pb-214		3.289E-01	21.67	7.129E-02	7.476E-02	3.143E-02
Ra-226	#	8.933E-01	71.44	6.382E-01	6.418E-01	4.647E-01
Th-230	#AB	1.182E+00	1857.00	2.195E+01	2.195E+01	1.800E+01
Th-234	#AB	4.868E-01	134.10	6.530E-01	6.544E-01	5.065E-01
Tl-208	#	4.863E-02	74.04	3.600E-02	3.615E-02	2.476E-02
U-235	#	5.697E-02	76.23	4.343E-02	4.364E-02	3.199E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 2.457E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:39

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-008

Sample Description: Parcel C

Detector: HPGe #12 51-TP32743A	Spectrum ID: 12_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:14	Live Time: 2700 sec
Acquisition Time: 1/6/2012 10:57:25	Real Time: 2703 sec
Analysis Time: 1/6/2012 11:42	Dead Time: 0.10 %
Analysis Quantity: 3.110E+02 g	

Efficiency: HPGe #12 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 12/23/2011 17:52

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		4.142E-01	34.91	1.446E-01	1.473E-01	8.189E-02
Am-241	#AB	1.613E-02	1270.00	2.049E-01	2.049E-01	1.676E-01
Bi-212	#AB	0.000E+00	2000.00	2.131E-01	2.131E-01	1.755E-01
Bi-214		3.892E-01	19.24	7.487E-02	7.925E-02	2.998E-02
Co-60	#AB	1.237E-02	258.30	3.194E-02	3.195E-02	2.478E-02
Cs-137	#AB	-9.368E-03	321.00	3.007E-02	3.007E-02	2.381E-02
Eu-152	#AB	1.128E-02	657.70	7.416E-02	7.417E-02	6.016E-02
Eu-154	#AB	2.999E-03	2994.00	8.979E-02	8.979E-02	7.358E-02
K-40		1.538E+01	8.30	1.277E+00	1.664E+00	2.581E-01
Pa-234	#AB	-1.356E-02	1181.00	1.600E-01	1.600E-01	1.301E-01
Pb-210	#AB	2.886E+00	413.90	1.194E+01	1.195E+01	9.655E+00
Pb-212		5.653E-01	16.26	9.194E-02	1.013E-01	4.033E-02
Pb-214		2.781E-01	26.36	7.332E-02	7.575E-02	4.257E-02
Ra-226		7.973E-01	72.49	5.779E-01	5.811E-01	4.279E-01
Th-230	#AB	4.657E-01	3020.00	1.406E+01	1.406E+01	1.156E+01
Th-234	#AB	-1.304E-02	5272.00	6.875E-01	6.875E-01	4.226E-01
Tl-208	#	1.455E-01	27.65	4.021E-02	4.136E-02	2.111E-02
U-235		3.635E-02	104.50	3.798E-02	3.808E-02	2.910E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 2.140E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:50

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-009

Sample Description: Parcel C

Detector: HPGe #4 50-TP42236A	Spectrum ID: 4_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:17	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:01:53	Real Time: 2703 sec
Analysis Time: 1/6/2012 11:47	Dead Time: 0.12 %
Analysis Quantity: 3.340E+02 g	

Efficiency: HPGe #4 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/22/2011 08:27

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228	#	2.681E-01	43.26	1.160E-01	1.174E-01	6.943E-02
Am-241	#	1.363E-01	79.10	1.078E-01	1.085E-01	7.643E-02
Bi-212	#AB	1.257E-01	147.80	1.858E-01	1.860E-01	1.385E-01
Bi-214		3.330E-01	19.36	6.447E-02	6.820E-02	1.168E-02
Co-60	#AB	-3.605E-04	8894.00	3.206E-02	3.206E-02	2.637E-02
Cs-137	#AB	-2.171E-03	1102.00	2.392E-02	2.392E-02	1.946E-02
Eu-152	#AB	-1.339E-03	3833.00	5.133E-02	5.133E-02	4.215E-02
Eu-154	#AB	2.403E-03	3343.00	8.034E-02	8.034E-02	6.587E-02
K-40		1.351E+01	8.91	1.204E+00	1.526E+00	2.198E-01
Pa-234	#AB	0.000E+00	2000.00	2.237E-02	2.237E-02	2.606E-02
Pb-210	#AB	1.419E+00	284.40	4.035E+00	4.037E+00	3.207E+00
Pb-212		3.674E-01	19.25	7.070E-02	7.594E-02	2.823E-02
Pb-214		3.529E-01	22.56	7.961E-02	8.319E-02	3.340E-02
Ra-226	AB	3.185E-01	154.20	4.912E-01	4.918E-01	3.853E-01
Th-230	#AB	-8.397E-01	1017.00	8.543E+00	8.543E+00	6.979E+00
Th-234	#AB	-3.165E-01	135.00	4.272E-01	4.282E-01	3.351E-01
Tl-208	#	8.963E-02	31.75	2.845E-02	2.907E-02	1.396E-02
U-235		5.087E-02	59.27	3.015E-02	3.039E-02	2.132E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.698E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:38

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-010

Sample Description: Parcel C

Detector: HPGe #5 50-TP42234A	Spectrum ID: 5_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:20	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:03:34	Real Time: 2702 sec
Analysis Time: 1/6/2012 11:48	Dead Time: 0.08 %
Analysis Quantity: 3.170E+02 g	

Efficiency: HPGe #5 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/19/2011 13:29

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		2.500E-01	41.96	1.049E-01	1.062E-01	5.729E-02
Am-241	#AB	3.099E-02	379.40	1.176E-01	1.176E-01	9.445E-02
Bi-212	#AB	0.000E+00	2000.00	1.978E-01	1.978E-01	1.826E-01
Bi-214		2.623E-01	30.89	8.104E-02	8.292E-02	3.071E-02
Co-60	#AB	9.538E-03	192.40	1.835E-02	1.836E-02	2.257E-02
Cs-137	#AB	-3.911E-03	635.30	2.485E-02	2.485E-02	2.002E-02
Eu-152	#AB	2.027E-02	287.00	5.817E-02	5.819E-02	4.592E-02
Eu-154	#AB	-5.464E-03	1453.00	7.938E-02	7.938E-02	6.466E-02
K-40		1.217E+01	9.49	1.155E+00	1.431E+00	1.904E-01
Pa-234	#AB	0.000E+00	2000.00	3.301E-02	3.301E-02	1.320E-01
Pb-210	#AB	0.000E+00	2000.00	2.634E+00	2.634E+00	3.553E+00
Pb-212		2.751E-01	32.44	8.923E-02	9.162E-02	4.343E-02
Pb-214		2.375E-01	26.25	6.235E-02	6.443E-02	2.906E-02
Ra-226		4.611E-01	94.13	4.340E-01	4.354E-01	3.239E-01
Th-230	#AB	-1.275E+00	686.50	8.751E+00	8.752E+00	7.120E+00
Th-234		8.443E-01	48.11	4.062E-01	4.132E-01	2.193E-01
Tl-208	#	7.128E-02	42.38	3.021E-02	3.058E-02	1.797E-02
U-235	AB	8.067E-03	383.60	3.095E-02	3.096E-02	2.497E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.464E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:38

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-011

Sample Description: Parcel C

Detector: HPGe #3 51-TP32733A	Spectrum ID: 3_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:23	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:00:44	Real Time: 2705 sec
Analysis Time: 1/6/2012 11:45	Dead Time: 0.20 %
Analysis Quantity: 3.260E+02 g	

Efficiency: HPGe #3 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/21/2011 12:07

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		4.936E-01	29.49	1.456E-01	1.493E-01	7.831E-02
Am-241	#AB	-9.112E-02	216.40	1.972E-01	1.973E-01	1.579E-01
Bi-212		9.029E-01	33.27	3.004E-01	3.066E-01	9.729E-02
Bi-214	#	5.505E-01	17.43	9.597E-02	1.028E-01	2.567E-02
Co-60	#AB	-2.170E-03	1535.00	3.331E-02	3.331E-02	2.721E-02
Cs-137	#AB	0.000E+00	2000.00	1.159E-02	1.159E-02	3.258E-02
Eu-152	#AB	1.037E-02	689.10	7.143E-02	7.144E-02	5.803E-02
Eu-154	#AB	9.412E-03	1001.00	9.424E-02	9.424E-02	7.654E-02
K-40		1.135E+01	10.45	1.186E+00	1.424E+00	3.409E-01
Pa-234	#AB	5.669E-03	2972.00	1.685E-01	1.685E-01	1.382E-01
Pb-210	#	5.450E+00	103.60	5.646E+00	5.671E+00	4.296E+00
Pb-212		7.286E-01	11.42	8.317E-02	9.969E-02	3.101E-02
Pb-214		5.602E-01	16.07	9.001E-02	9.783E-02	3.012E-02
Ra-226		1.001E+00	58.46	5.851E-01	5.900E-01	4.269E-01
Th-230	#AB	-3.999E+00	329.40	1.317E+01	1.318E+01	1.066E+01
Th-234	#	5.039E-01	94.29	4.751E-01	4.772E-01	3.663E-01
Tl-208		2.397E-01	19.10	4.579E-02	4.849E-02	1.278E-02
U-235		3.606E-02	109.50	3.950E-02	3.960E-02	3.064E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 2.184E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:36

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-012

Sample Description: Parcel C

Detector: HPGe #11 51-TP32744A	Spectrum ID: 11_20120109_011
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:26	Live Time: 5400 sec
Acquisition Time: 1/9/2012 13:58:18	Real Time: 5405 sec
Analysis Time: 1/9/2012 15:28	Dead Time: 0.09 %
Analysis Quantity: 2.850E+02 g	

Efficiency: HPGe #11 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 1/5/2012 11:14

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228	#	3.740E-01	24.50	9.165E-02	9.505E-02	4.526E-02
Am-241	#AB	-5.910E-02	305.20	1.803E-01	1.804E-01	1.463E-01
Bi-212	#	1.781E-01	89.34	1.591E-01	1.596E-01	1.164E-01
Bi-214		3.793E-01	16.88	6.402E-02	6.884E-02	2.059E-02
Co-60	#AB	-1.528E-03	1545.00	2.360E-02	2.360E-02	1.930E-02
Cs-137	#AB	2.502E-03	676.40	1.692E-02	1.692E-02	1.370E-02
Eu-152	#AB	1.513E-02	332.40	5.029E-02	5.030E-02	4.042E-02
Eu-154	#AB	-1.541E-02	467.70	7.206E-02	7.207E-02	5.801E-02
K-40		8.642E+00	8.27	7.143E-01	9.326E-01	1.751E-01
Pa-234	#AB	0.000E+00	2000.00	1.360E-02	1.360E-02	1.587E-01
Pb-210	#AB	-3.769E+00	208.80	7.870E+00	7.878E+00	6.354E+00
Pb-212		4.220E-01	13.61	5.742E-02	6.566E-02	2.479E-02
Pb-214		3.887E-01	18.38	7.143E-02	7.622E-02	3.168E-02
Ra-226		5.832E-01	67.20	3.919E-01	3.944E-01	2.948E-01
Th-230	#AB	-5.902E+00	167.20	9.869E+00	9.881E+00	7.879E+00
Th-234	#	8.766E-01	44.26	3.880E-01	3.958E-01	2.219E-01
Tl-208		1.834E-01	20.27	3.716E-02	3.911E-02	1.214E-02
U-235		4.177E-02	64.61	2.699E-02	2.717E-02	2.029E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.209E+01

Analyst: Andrew Alexander

Reviewer: Philip Smith
Review Date: 1/10/2012 14:47

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-012DUP

Sample Description: Parcel C

Detector: HPGe #11 51-TP32744A	Spectrum ID: 11_20120109_013
Contract: Tetra Tech HPS	Sample Type: DUP
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:26	Live Time: 5400 sec
Acquisition Time: 1/9/2012 17:50:17	Real Time: 5405 sec
Analysis Time: 1/9/2012 19:20	Dead Time: 0.09 %
Analysis Quantity: 2.850E+02 g	

Efficiency: HPGe #11 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 1/5/2012 11:14

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		5.093E-01	21.46	1.093E-01	1.146E-01	2.951E-02
Am-241	#AB	-5.636E-02	266.90	1.504E-01	1.505E-01	1.214E-01
Bi-212	#	2.891E-01	53.06	1.534E-01	1.546E-01	1.002E-01
Bi-214		3.837E-01	16.25	6.233E-02	6.739E-02	2.919E-02
Co-60	#AB	3.996E-03	145.30	5.807E-03	5.813E-03	1.884E-02
Cs-137	#AB	3.051E-03	570.30	1.740E-02	1.740E-02	1.404E-02
Eu-152	#AB	1.271E-02	286.60	3.643E-02	3.644E-02	2.883E-02
Eu-154	#AB	1.270E-02	502.00	6.376E-02	6.377E-02	5.127E-02
K-40		8.044E+00	9.39	7.554E-01	9.393E-01	2.224E-01
Pa-234	#AB	4.166E-02	281.60	1.173E-01	1.174E-01	9.260E-02
Pb-210	AB	1.061E-01	4898.00	5.195E+00	5.195E+00	4.274E+00
Pb-212		4.669E-01	13.29	6.205E-02	7.135E-02	2.609E-02
Pb-214		4.052E-01	16.32	6.615E-02	7.173E-02	2.950E-02
Ra-226		6.475E-01	63.67	4.123E-01	4.152E-01	3.100E-01
Th-230	#AB	-3.289E+00	280.90	9.239E+00	9.243E+00	7.463E+00
Th-234	#	3.041E-01	113.60	3.456E-01	3.467E-01	2.717E-01
Tl-208		1.390E-01	23.58	3.278E-02	3.406E-02	1.280E-02
U-235		3.086E-02	87.32	2.695E-02	2.705E-02	2.078E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.140E+01

Analyst: Andrew Alexander

Reviewer: Philip Smith
Review Date: 1/10/2012 14:52

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-013

Sample Description: Parcel C

Detector: HPGe #8 51-TP42242A	Spectrum ID: 8_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:29	Live Time: 2700 sec
Acquisition Time: 1/6/2012 10:53:13	Real Time: 2703 sec
Analysis Time: 1/6/2012 11:38	Dead Time: 0.10 %
Analysis Quantity: 3.020E+02 g	

Efficiency: HPGe #8 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 12/20/2011 12:02

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		9.112E-01	19.98	1.820E-01	1.921E-01	7.452E-02
Am-241	#AB	-4.639E-02	508.70	2.360E-01	2.360E-01	1.921E-01
Bi-212	#	6.926E-01	41.33	2.863E-01	2.901E-01	1.689E-01
Bi-214		6.762E-01	13.90	9.400E-02	1.043E-01	7.612E-03
Co-60	#AB	9.236E-03	253.20	2.339E-02	2.340E-02	2.620E-02
Cs-137	#AB	9.412E-03	345.00	3.247E-02	3.247E-02	2.583E-02
Eu-152	AB	2.277E-03	3490.00	7.946E-02	7.946E-02	6.528E-02
Eu-154	#AB	0.000E+00	2000.00	2.008E-02	2.008E-02	1.519E-01
K-40		7.932E+00	11.47	9.099E-01	1.063E+00	6.080E-02
Pa-234	#AB	1.236E-02	1579.00	1.951E-01	1.951E-01	1.594E-01
Pb-210	#AB	-4.091E+00	185.70	7.598E+00	7.609E+00	6.033E+00
Pb-212		1.014E+00	11.88	1.205E-01	1.427E-01	4.982E-02
Pb-214		6.155E-01	20.22	1.244E-01	1.314E-01	5.055E-02
Ra-226		5.931E-01	100.10	5.936E-01	5.953E-01	4.549E-01
Th-230	#AB	-5.600E+00	295.60	1.655E+01	1.656E+01	1.338E+01
Th-234	#	7.325E-01	89.32	6.543E-01	6.575E-01	5.081E-01
Tl-208		4.046E-01	14.85	6.008E-02	6.583E-02	1.709E-02
U-235		7.579E-02	80.03	6.065E-02	6.092E-02	2.979E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.368E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:39

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-014

Sample Description: Parcel C

Detector: HPGe #7 50-TP32731A	Spectrum ID: 7_20120106_008
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:33	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:39:56	Real Time: 2703 sec
Analysis Time: 1/6/2012 12:25	Dead Time: 0.10 %
Analysis Quantity: 2.950E+02 g	

Efficiency: HPGe #7 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 12/19/2011 13:07

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228	#	2.958E-01	43.74	1.294E-01	1.309E-01	6.718E-02
Am-241	#AB	1.777E-01	188.60	3.352E-01	3.356E-01	2.604E-01
Bi-212	#	1.749E-01	137.00	2.397E-01	2.400E-01	1.746E-01
Bi-214		1.798E-01	44.99	8.089E-02	8.178E-02	4.965E-02
Co-60	#AB	0.000E+00	1414.00	5.945E-03	5.945E-03	6.926E-03
Cs-137	#AB	7.524E-03	384.50	2.893E-02	2.893E-02	2.281E-02
Eu-152	#AB	5.308E-02	142.20	7.547E-02	7.555E-02	5.650E-02
Eu-154	#AB	0.000E+00	2000.00	1.780E-02	1.780E-02	2.074E-02
K-40		6.887E+00	14.24	9.809E-01	1.091E+00	2.792E-01
Pa-234	#AB	-7.335E-02	292.20	2.144E-01	2.144E-01	1.672E-01
Pb-210	#AB	4.553E+00	604.40	2.752E+01	2.753E+01	2.236E+01
Pb-212		4.073E-01	19.69	8.021E-02	8.589E-02	3.371E-02
Pb-214		2.521E-01	33.44	8.429E-02	8.604E-02	4.597E-02
Ra-226		1.100E+00	56.09	6.169E-01	6.225E-01	4.253E-01
Th-230	#AB	9.635E+00	203.40	1.959E+01	1.961E+01	1.537E+01
Th-234	#AB	1.238E-01	453.20	5.609E-01	5.610E-01	4.526E-01
Tl-208		1.472E-01	29.97	4.412E-02	4.519E-02	1.386E-02
U-235	AB	3.445E-03	1331.00	4.583E-02	4.584E-02	3.754E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 2.400E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:39

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-015

Sample Description: Parcel C

Detector: HPGe #1 50-TP42232A	Spectrum ID: 1_20120106_007
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:36	Live Time: 2700 sec
Acquisition Time: 1/6/2012 10:59:19	Real Time: 2708 sec
Analysis Time: 1/6/2012 11:44	Dead Time: 0.28 %
Analysis Quantity: 2.780E+02 g	

Efficiency: HPGe #1 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/20/2011 12:18

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228	#	2.352E-01	53.00	1.247E-01	1.257E-01	7.532E-02
Am-241	#AB	-5.804E-02	526.50	3.055E-01	3.056E-01	2.473E-01
Bi-212	#	2.772E-01	91.81	2.545E-01	2.552E-01	1.785E-01
Bi-214	#	1.635E-01	48.89	7.993E-02	8.067E-02	5.497E-02
Co-60	#AB	1.042E-02	301.20	3.139E-02	3.139E-02	2.436E-02
Cs-137	#	2.712E-02	115.50	3.132E-02	3.137E-02	2.261E-02
Eu-152	#AB	1.531E-02	437.10	6.692E-02	6.693E-02	5.352E-02
Eu-154	#AB	-1.861E-02	456.30	8.490E-02	8.491E-02	6.701E-02
K-40		6.372E+00	13.55	8.632E-01	9.698E-01	6.811E-02
Pa-234	#AB	0.000E+00	2000.00	2.887E-02	2.887E-02	1.658E-01
Pb-210	#AB	8.655E-01	2056.00	1.779E+01	1.779E+01	1.458E+01
Pb-212		3.509E-01	22.19	7.787E-02	8.225E-02	3.655E-02
Pb-214		2.684E-01	29.53	7.928E-02	8.138E-02	3.608E-02
Ra-226		6.926E-01	85.19	5.900E-01	5.924E-01	4.392E-01
Th-230	#AB	-2.211E+00	737.90	1.632E+01	1.632E+01	1.328E+01
Th-234	#AB	2.530E-01	215.60	5.455E-01	5.460E-01	4.328E-01
Tl-208	#	6.166E-02	51.85	3.197E-02	3.224E-02	1.941E-02
U-235		3.604E-02	110.60	3.985E-02	3.995E-02	3.046E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 9.629E+00

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:35

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-016

Sample Description: Parcel C

Detector: HPGe #8 51-TP42242A	Spectrum ID: 8_20120106_008
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:39	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:41:16	Real Time: 2702 sec
Analysis Time: 1/6/2012 12:26	Dead Time: 0.07 %
Analysis Quantity: 2.850E+02 g	

Efficiency: HPGe #8 Tuna Can Soil Solid 85625-918

Efficiency Cal Date: 12/20/2011 12:02

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		2.409E-01	50.21	1.210E-01	1.220E-01	7.199E-02
Am-241	#AB	1.434E-02	927.80	1.330E-01	1.330E-01	1.083E-01
Bi-212	#AB	1.444E-01	164.90	2.381E-01	2.383E-01	1.802E-01
Bi-214		3.621E-01	23.28	8.431E-02	8.770E-02	2.338E-02
Co-60	#AB	1.851E-03	1773.00	3.282E-02	3.282E-02	2.680E-02
Cs-137	#AB	1.580E-02	172.20	2.722E-02	2.724E-02	2.042E-02
Eu-152	#AB	-2.080E-02	337.00	7.009E-02	7.011E-02	5.577E-02
Eu-154	#AB	0.000E+00	2000.00	1.505E-02	1.505E-02	1.971E-01
K-40	#	5.520E+00	14.55	8.034E-01	8.901E-01	1.541E-01
Pa-234	#AB	4.286E-03	4021.00	1.723E-01	1.723E-01	1.414E-01
Pb-210	#AB	-9.334E-02	5318.00	4.964E+00	4.964E+00	4.081E+00
Pb-212		3.684E-01	20.32	7.485E-02	7.985E-02	3.663E-02
Pb-214		2.162E-01	34.28	7.410E-02	7.556E-02	4.730E-02
Ra-226	#	6.772E-01	81.98	5.551E-01	5.575E-01	4.126E-01
Th-230	#AB	5.038E+00	216.90	1.093E+01	1.093E+01	8.632E+00
Th-234	#	3.481E-01	128.90	4.486E-01	4.497E-01	3.468E-01
Tl-208	#	1.048E-01	34.96	3.663E-02	3.728E-02	2.167E-02
U-235	#	4.182E-02	91.22	3.815E-02	3.828E-02	2.877E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.310E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:39

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-017

Sample Description: Parcel C

Detector: HPGe #3 51-TP32733A	Spectrum ID: 3_20120106_008
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:42	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:55:54	Real Time: 2704 sec
Analysis Time: 1/6/2012 12:41	Dead Time: 0.16 %
Analysis Quantity: 2.690E+02 g	

Efficiency: HPGe #3 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/21/2011 12:07

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228	#	3.238E-01	42.23	1.367E-01	1.385E-01	7.831E-02
Am-241	#AB	8.410E-02	170.80	1.436E-01	1.438E-01	1.112E-01
Bi-212	#AB	9.579E-02	255.00	2.443E-01	2.444E-01	1.909E-01
Bi-214		3.104E-01	23.39	7.261E-02	7.551E-02	1.598E-02
Co-60	#AB	-3.591E-03	873.80	3.138E-02	3.138E-02	2.535E-02
Cs-137	#	1.887E-02	137.00	2.585E-02	2.588E-02	1.870E-02
Eu-152	#AB	-1.748E-02	424.60	7.420E-02	7.421E-02	5.951E-02
Eu-154	#AB	-1.888E-02	467.50	8.825E-02	8.826E-02	6.982E-02
K-40	#	3.330E+00	23.25	7.744E-01	8.082E-01	4.268E-01
Pa-234	#AB	-6.118E-02	314.50	1.924E-01	1.924E-01	1.509E-01
Pb-210	#AB	1.531E-01	3071.00	4.702E+00	4.702E+00	3.860E+00
Pb-212		4.544E-01	18.60	8.454E-02	9.123E-02	3.721E-02
Pb-214		3.592E-01	23.85	8.568E-02	8.913E-02	3.379E-02
Ra-226	#AB	3.906E-01	141.10	5.512E-01	5.520E-01	4.272E-01
Th-230	#AB	6.124E+00	176.40	1.080E+01	1.081E+01	8.463E+00
Th-234	#	5.402E-01	86.67	4.682E-01	4.707E-01	3.522E-01
Tl-208		1.725E-01	28.54	4.923E-02	5.054E-02	1.634E-02
U-235	#	2.883E-02	123.70	3.565E-02	3.572E-02	2.731E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.239E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:36

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-018

Sample Description: Parcel C

Detector: HPGe #5 50-TP42234A	Spectrum ID: 5_20120106_008
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:45	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:58:14	Real Time: 2702 sec
Analysis Time: 1/6/2012 12:43	Dead Time: 0.09 %
Analysis Quantity: 3.110E+02 g	

Efficiency: HPGe #5 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/19/2011 13:29

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		4.284E-01	31.05	1.330E-01	1.361E-01	6.852E-02
Am-241	#AB	6.012E-03	2243.00	1.348E-01	1.348E-01	1.107E-01
Bi-212	#	3.211E-01	70.19	2.253E-01	2.264E-01	1.514E-01
Bi-214		4.720E-01	17.99	8.491E-02	9.057E-02	2.203E-02
Co-60	#AB	7.366E-05	34040.00	2.508E-02	2.508E-02	2.065E-02
Cs-137		6.229E-02	40.64	2.531E-02	2.566E-02	9.015E-03
Eu-152	#AB	-8.697E-03	892.40	7.761E-02	7.761E-02	6.329E-02
Eu-154	#AB	4.460E-02	173.30	7.730E-02	7.735E-02	5.713E-02
K-40		1.066E+01	10.02	1.068E+00	1.299E+00	1.439E-01
Pa-234	#AB	6.289E-02	272.00	1.711E-01	1.711E-01	1.335E-01
Pb-210	#AB	2.704E-01	1593.00	4.306E+00	4.306E+00	3.528E+00
Pb-212		7.008E-01	12.23	8.568E-02	1.007E-01	3.228E-02
Pb-214		6.355E-01	16.10	1.023E-01	1.112E-01	3.691E-02
Ra-226		6.950E-01	87.61	6.089E-01	6.111E-01	4.652E-01
Th-230	#AB	-1.288E-01	9152.00	1.179E+01	1.179E+01	9.703E+00
Th-234	#AB	3.331E-01	153.30	5.106E-01	5.115E-01	4.047E-01
Tl-208		2.352E-01	18.85	4.434E-02	4.701E-02	1.282E-02
U-235		4.408E-02	91.97	4.054E-02	4.068E-02	3.109E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.497E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:38

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-019

Sample Description: Parcel C

Detector: HPGe #4 50-TP42236A	Spectrum ID: 4_20120106_008
Contract: Tetra Tech HPS	Sample Type: SAMPLE
Unit Number: 232	Matrix: S
Sample Time: 12/14/2011 11:48	Live Time: 2700 sec
Acquisition Time: 1/6/2012 11:56:59	Real Time: 2702 sec
Analysis Time: 1/6/2012 12:42	Dead Time: 0.09 %
Analysis Quantity: 3.090E+02 g	

Efficiency: HPGe #4 Tuna Can Soil Solid 85624-918

Efficiency Cal Date: 12/22/2011 08:27

Library: GenericAnalysis.lib

Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		4.291E-01	32.18	1.381E-01	1.411E-01	7.408E-02
Am-241	#AB	4.388E-02	320.10	1.405E-01	1.405E-01	1.126E-01
Bi-212	#	3.309E-01	75.00	2.481E-01	2.492E-01	1.726E-01
Bi-214		6.466E-01	16.50	1.067E-01	1.151E-01	2.788E-02
Co-60	#AB	5.697E-03	360.40	2.053E-02	2.054E-02	2.343E-02
Cs-137	#	2.281E-02	127.50	2.909E-02	2.913E-02	2.159E-02
Eu-152	#AB	3.973E-03	1643.00	6.530E-02	6.530E-02	5.344E-02
Eu-154	#AB	1.406E-02	671.00	9.430E-02	9.431E-02	7.600E-02
K-40		9.556E+00	10.36	9.898E-01	1.191E+00	1.268E-01
Pa-234	#AB	0.000E+00	2000.00	3.419E-02	3.419E-02	1.388E-01
Pb-210	#AB	-1.700E-01	2997.00	5.096E+00	5.096E+00	4.186E+00
Pb-212		6.357E-01	13.59	8.641E-02	9.883E-02	3.336E-02
Pb-214		3.835E-01	21.12	8.102E-02	8.516E-02	4.434E-02
Ra-226		9.890E-01	52.87	5.229E-01	5.282E-01	3.666E-01
Th-230	#AB	2.775E+00	467.40	1.297E+01	1.297E+01	1.055E+01
Th-234		1.053E+00	48.22	5.079E-01	5.166E-01	2.888E-01
Tl-208		2.441E-01	20.56	5.020E-02	5.276E-02	1.557E-02
U-235	AB	2.173E-02	169.70	3.687E-02	3.691E-02	2.912E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.716E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:38

TetraTech Hunter's Point Lab

Sample ID: 02-PCT-232-020

Sample Description: Parcel C

Detector: HPGe #12 51-TP32743A Spectrum ID: 12_20120106_008
 Contract: Tetra Tech HPS Sample Type: SAMPLE
 Unit Number: 232 Matrix: S
 Sample Time: 12/14/2011 11:51 Live Time: 2700 sec
 Acquisition Time: 1/6/2012 11:45:42 Real Time: 2704 sec
 Analysis Time: 1/6/2012 12:30 Dead Time: 0.13 %
 Analysis Quantity: 3.080E+02 g

Efficiency: HPGe #12 Tuna Can Soil Solid 85625-918
 Efficiency Cal Date: 12/23/2011 17:52
 Library: GenericAnalysis.lib
 Analysis Engine: Env32 G53W4.26

Nuclide	Flags	Activity pCi/g	2-Sigma Counting Uncert %	2-Sigma Counting Uncert pCi/g	2-Sigma Total Uncert pCi/g	Minimum Detectable Activity pCi/g
Ac-228		1.292E+00	15.80	2.040E-01	2.218E-01	4.373E-02
Am-241		2.212E-01	105.70	2.339E-01	2.347E-01	1.776E-01
Bi-212	#	5.710E-01	52.59	3.003E-01	3.027E-01	1.982E-01
Bi-214		6.676E-01	16.47	1.100E-01	1.186E-01	5.342E-02
Co-60	#AB	1.740E-03	1950.00	3.394E-02	3.394E-02	2.776E-02
Cs-137	#AB	1.232E-02	280.20	3.451E-02	3.452E-02	2.732E-02
Eu-152	#AB	-5.919E-04	9786.00	5.792E-02	5.792E-02	4.765E-02
Eu-154	#AB	0.000E+00	2000.00	3.972E-02	3.972E-02	1.049E-01
K-40		7.129E+00	13.25	9.449E-01	1.067E+00	2.979E-01
Pa-234	#AB	-7.778E-02	295.60	2.299E-01	2.300E-01	1.822E-01
Pb-210	#AB	-6.089E-01	2247.00	1.368E+01	1.368E+01	1.124E+01
Pb-212		1.269E+00	9.86	1.251E-01	1.575E-01	4.745E-02
Pb-214		8.814E-01	15.19	1.339E-01	1.469E-01	5.012E-02
Ra-226		9.489E-01	80.92	7.679E-01	7.712E-01	5.897E-01
Th-230	#AB	-1.151E+00	1331.00	1.532E+01	1.532E+01	1.255E+01
Th-234		2.338E+00	36.15	8.453E-01	8.709E-01	4.292E-01
Tl-208		4.245E-01	14.35	6.091E-02	6.714E-02	1.750E-02
U-235		6.225E-02	81.09	5.048E-02	5.070E-02	3.874E-02

- All peaks for activity calculation had bad shape.

A - Activity < MDA

B - Activity < Critical Level

Total Activity 1.582E+01

Analyst: Chris Fluty

Reviewer: Philip Smith
Review Date: 1/9/2012 12:50

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-003

Radiochemistry

Lab Sample ID: F2A300427-001

Work Order: MQGTK

Matrix: SOLID

Date Collected: 12/14/11 1100

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.729		0.165		0.0770	60	01/09/12	02/02/12
Americium 241	0.0	U	0.0794		0.0701	60	01/09/12	02/02/12
Bismuth 212	0.370		0.341		0.217	60	01/09/12	02/02/12
Bismuth 214	0.538		0.157		0.0700	60	01/09/12	02/02/12
Cesium 137	0.00494	U	0.0302	0.0700	0.0244	60	01/09/12	02/02/12
Cobalt 60	0.0115	U	0.0439		0.0349	60	01/09/12	02/02/12
Europium 152	0.0310	U	0.0931		0.0688	60	01/09/12	02/02/12
Europium 154	0.00907	U	0.0769		0.191	60	01/09/12	02/02/12
Lead 210	0.637	U	0.958	1.50	0.698	60	01/09/12	02/02/12
Lead 212	0.541		0.109		0.0506	60	01/09/12	02/02/12
Lead 214	0.679		0.131		0.0642	60	01/09/12	02/02/12
Potassium 40	14.9		1.96		0.233	60	01/09/12	02/02/12
Protactinium 234	0.0252	U	0.102		0.0815	60	01/09/12	02/02/12
Radium (226)	0.538	J	0.157	0.700	0.0700	60	01/09/12	02/02/12
Thallium 208	0.210		0.0679		0.0294	60	01/09/12	02/02/12
Thorium 232	0.729		0.165		0.0770	60	01/09/12	02/02/12
Thorium 234	1.55		0.921		0.566	60	01/09/12	02/02/12
Uranium 235	0.0446	U	0.204		0.169	60	01/09/12	02/02/12

NOTE(S)

Data are incomplete without the case narrative.
Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-003 DUP

Radiochemistry

Lab Sample ID: F2A300427-001X
 Work Order: MQGTK
 Matrix: SOLID

Date Collected: 12/14/11 1100
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD			pCi/g		Batch # 2032029			
Actinium 228	0.519		0.173		0.108	60	01/09/12	02/02/12
Americium 241	0.0767		0.0826		0.0525	60	01/09/12	02/02/12
Bismuth 212	0.216	U	0.294		0.222	60	01/09/12	02/02/12
Bismuth 214	0.762		0.148		0.0540	60	01/09/12	02/02/12
Cesium 137	-0.000303	U	0.0336	0.0700	0.0276	60	01/09/12	02/02/12
Cobalt 60	0.0	U	0.0175		0.0310	60	01/09/12	02/02/12
Europium 152	0.0508	U	0.107		0.0732	60	01/09/12	02/02/12
Europium 154	0.00233	U	0.0246		0.245	60	01/09/12	02/02/12
Lead 210	2.41		1.24	1.50	0.781	60	01/09/12	02/02/12
Lead 212	0.682		0.126		0.0500	60	01/09/12	02/02/12
Lead 214	0.649		0.126		0.0603	60	01/09/12	02/02/12
Potassium 40	14.6		1.94		0.360	60	01/09/12	02/02/12
Protactinium 234	0.0399	U	0.142		0.102	60	01/09/12	02/02/12
Radium (226)	0.762		0.148	0.700	0.0540	60	01/09/12	02/02/12
Thallium 208	0.229		0.0689		0.0305	60	01/09/12	02/02/12
Thorium 232	0.519		0.173		0.108	60	01/09/12	02/02/12
Thorium 234	1.54		1.03		0.673	60	01/09/12	02/02/12
Uranium 235	0.0836	U	0.240		0.163	60	01/09/12	02/02/12

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-004

Radiochemistry

Lab Sample ID: F2A300427-002
 Work Order: MQGTL
 Matrix: SOLID

Date Collected: 12/14/11 1103
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.187	U	0.266		0.201	30	01/09/12	02/01/12
Americium 241	-0.00685	U	0.111		0.0907	30	01/09/12	02/01/12
Bismuth 212	0.0	U	0.571		0.270	30	01/09/12	02/01/12
Bismuth 214	0.429		0.135		0.0372	30	01/09/12	02/01/12
Cesium 137	-0.00753	U	0.234	0.0700	0.0490	30	01/09/12	02/01/12
Cobalt 60	-0.0200	U	0.0710		0.0547	30	01/09/12	02/01/12
Europium 152	0.0681	U	0.218		0.0961	30	01/09/12	02/01/12
Europium 154	0.113	U	0.203		0.384	30	01/09/12	02/01/12
Lead 210	-0.0529	U	1.49	1.50	1.23	30	01/09/12	02/01/12
Lead 212	0.446		0.143		0.0605	30	01/09/12	02/01/12
Lead 214	0.488		0.162		0.0597	30	01/09/12	02/01/12
Potassium 40	20.8		3.25		0.293	30	01/09/12	02/01/12
Protactinium 234	0.209		0.264		0.131	30	01/09/12	02/01/12
Radium (226)	0.429	J	0.135	0.700	0.0372	30	01/09/12	02/01/12
Thallium 208	0.0979		0.0655		0.0417	30	01/09/12	02/01/12
Thorium 232	0.187	U	0.266		0.201	30	01/09/12	02/01/12
Thorium 234	0.425	U	0.652		0.919	30	01/09/12	02/01/12
Uranium 235	0.0926	U	0.202		0.227	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-005

Radiochemistry

Lab Sample ID: F2A300427-003

Work Order: MQGTM

Matrix: SOLID

Date Collected: 12/14/11 1106

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.510		0.194		0.145	30	01/09/12	02/01/12
Americium 241	0.0499	U	0.110		0.0869	30	01/09/12	02/01/12
Bismuth 212	0.384		0.505		0.294	30	01/09/12	02/01/12
Bismuth 214	0.269		0.135		0.0867	30	01/09/12	02/01/12
Cesium 137	-0.0167	U	0.0607	0.0700	0.0480	30	01/09/12	02/01/12
Cobalt 60	0.0	U	0.0178		0.0569	30	01/09/12	02/01/12
Europium 152	0.00723	U	0.0693		0.105	30	01/09/12	02/01/12
Europium 154	-0.154	U	0.471		0.368	30	01/09/12	02/01/12
Lead 210	-0.300	U	1.69	1.50	1.24	30	01/09/12	02/01/12
Lead 212	0.532		0.142		0.0684	30	01/09/12	02/01/12
Lead 214	0.524		0.143		0.0710	30	01/09/12	02/01/12
Potassium 40	19.1		2.88		0.291	30	01/09/12	02/01/12
Protactinium 234	-0.0717	U	0.180		0.143	30	01/09/12	02/01/12
Radium (226)	0.269	J	0.135	0.700	0.0867	30	01/09/12	02/01/12
Thallium 208	0.0879		0.0659		0.0481	30	01/09/12	02/01/12
Thorium 232	0.510		0.194		0.145	30	01/09/12	02/01/12
Thorium 234	0.795		1.03		0.793	30	01/09/12	02/01/12
Uranium 235	0.132	U	0.289		0.245	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-006

Radiochemistry

Lab Sample ID: F2A300427-004

Work Order: MQGTM

Matrix: SOLID

Date Collected: 12/14/11 1109

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.413		0.160		0.0847	30	01/09/12	02/01/12
Americium 241	0.0110	U	0.0969		0.0790	30	01/09/12	02/01/12
Bismuth 212	0.172	U	0.303		0.228	30	01/09/12	02/01/12
Bismuth 214	0.592		0.158		0.0586	30	01/09/12	02/01/12
Cesium 137	-0.0153	U	0.0491	0.0700	0.0385	30	01/09/12	02/01/12
Cobalt 60	0.0	U	0.0225		0.0865	30	01/09/12	02/01/12
Europium 152	0.0501	U	0.0976		0.0772	30	01/09/12	02/01/12
Europium 154	0.0474	U	0.335		0.268	30	01/09/12	02/01/12
Lead 210	1.17	J	1.39	1.50	1.14	30	01/09/12	02/01/12
Lead 212	0.380		0.117		0.0560	30	01/09/12	02/01/12
Lead 214	0.478		0.140		0.0577	30	01/09/12	02/01/12
Potassium 40	13.0		2.20		0.412	30	01/09/12	02/01/12
Protactinium 234	0.0861	U	0.153		0.100	30	01/09/12	02/01/12
Radium (226)	0.592	J	0.158	0.700	0.0586	30	01/09/12	02/01/12
Thallium 208	0.124		0.0471		0.0217	30	01/09/12	02/01/12
Thorium 232	0.413		0.160		0.0847	30	01/09/12	02/01/12
Thorium 234	0.205	U	1.08		0.917	30	01/09/12	02/01/12
Uranium 235	0.144	U	0.155		0.157	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-007

Radiochemistry

Lab Sample ID: F2A300427-005

Work Order: MQGTP

Matrix: SOLID

Date Collected: 12/14/11 1110

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	pCi/g	Batch #	Count Time	Prep Date	Analysis Date
				RL	MDL			
Gamma Ra-226 & hits by EPA 901.1 MOD					Batch # 2032029			
Actinium 228	0.263		0.169		0.103	30	01/09/12	02/01/12
Americium 241	-0.0127	U	0.125		0.102	30	01/09/12	02/01/12
Bismuth 212	0.262	U	0.578		0.334	30	01/09/12	02/01/12
Bismuth 214	0.394		0.135		0.0623	30	01/09/12	02/01/12
Cesium 137	0.00820	U	0.0569	0.0700	0.0459	30	01/09/12	02/01/12
Cobalt 60	0.0	U	0.0119		0.0138	30	01/09/12	02/01/12
Europium 152	0.0863	U	0.112		0.101	30	01/09/12	02/01/12
Europium 154	-0.0942	U	0.443		0.352	30	01/09/12	02/01/12
Lead 210	0.801	U	2.13	1.50	1.38	30	01/09/12	02/01/12
Lead 212	0.317		0.141		0.0712	30	01/09/12	02/01/12
Lead 214	0.514		0.167		0.0645	30	01/09/12	02/01/12
Potassium 40	20.5		3.17		0.530	30	01/09/12	02/01/12
Protactinium 234	0.0599	U	0.175		0.122	30	01/09/12	02/01/12
Radium (226)	0.394	J	0.135	0.700	0.0623	30	01/09/12	02/01/12
Thallium 208	0.130		0.0632		0.0350	30	01/09/12	02/01/12
Thorium 232	0.263		0.169		0.103	30	01/09/12	02/01/12
Thorium 234	1.95		1.41		0.883	30	01/09/12	02/01/12
Uranium 235	0.183	U	0.223		0.213	30	01/09/12	02/01/12

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-008

Radiochemistry

Lab Sample ID: F2A300427-006

Work Order: MQGTO

Matrix: SOLID

Date Collected: 12/14/11 1114

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.515		0.224		0.103	30	01/09/12	02/01/12
Americium 241	-0.0318	U	0.117		0.0944	30	01/09/12	02/01/12
Bismuth 212	0.764		0.711		0.243	30	01/09/12	02/01/12
Bismuth 214	0.483		0.160		0.0768	30	01/09/12	02/01/12
Cesium 137	0.00628	U	0.0573	0.0700	0.0464	30	01/09/12	02/01/12
Cobalt 60	-0.0151	U	0.0655		0.0517	30	01/09/12	02/01/12
Europium 152	0.0702	U	0.128		0.0993	30	01/09/12	02/01/12
Europium 154	-0.197	U	0.491		0.381	30	01/09/12	02/01/12
Lead 210	0.728	U	1.26	1.50	1.00	30	01/09/12	02/01/12
Lead 212	0.461		0.140		0.0698	30	01/09/12	02/01/12
Lead 214	0.517		0.155		0.0799	30	01/09/12	02/01/12
Potassium 40	16.4		2.53		0.473	30	01/09/12	02/01/12
Protactinium 234	0.0324	U	0.161		0.129	30	01/09/12	02/01/12
Radium (226)	0.483	J	0.160	0.700	0.0768	30	01/09/12	02/01/12
Thallium 208	0.219		0.0710		0.0293	30	01/09/12	02/01/12
Thorium 232	0.515		0.224		0.103	30	01/09/12	02/01/12
Thorium 234	1.01		1.20		0.891	30	01/09/12	02/01/12
Uranium 235	0.143	U	0.292		0.221	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-009

Radiochemistry

Lab Sample ID: F2A300427-007

Work Order: MQGTR

Matrix: SOLID

Date Collected: 12/14/11 1117

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.330		0.207		0.142	30	01/09/12	02/01/12
Americium 241	0.00165	U	0.109		0.0899	30	01/09/12	02/01/12
Bismuth 212	0.131	U	0.396		0.309	30	01/09/12	02/01/12
Bismuth 214	0.258		0.134		0.0929	30	01/09/12	02/01/12
Cesium 137	-0.00357	U	0.0452	0.0700	0.0367	30	01/09/12	02/01/12
Cobalt 60	-0.0123	U	0.0669		0.0534	30	01/09/12	02/01/12
Europium 152	0.00973	U	0.0606		0.0871	30	01/09/12	02/01/12
Europium 154	-0.00146	U	0.00454		0.289	30	01/09/12	02/01/12
Lead 210	-0.411	U	2.80	1.50	1.09	30	01/09/12	02/01/12
Lead 212	0.492		0.131		0.0579	30	01/09/12	02/01/12
Lead 214	0.377		0.149		0.0795	30	01/09/12	02/01/12
Potassium 40	13.8		2.23		0.316	30	01/09/12	02/01/12
Protactinium 234	0.125		0.148		0.0825	30	01/09/12	02/01/12
Radium (226)	0.258	J	0.134	0.700	0.0929	30	01/09/12	02/01/12
Thallium 208	0.100		0.0586		0.0383	30	01/09/12	02/01/12
Thorium 232	0.330		0.207		0.142	30	01/09/12	02/01/12
Thorium 234	0.423	U	1.05		0.877	30	01/09/12	02/01/12
Uranium 235	0.136	U	0.263		0.198	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.
Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-010

Radiochemistry

Lab Sample ID: F2A300427-008

Date Collected: 12/14/11 1120

Work Order: MQGTT

Date Received: 01/30/12 1040

Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
					pCi/g		Batch # 2032029	Yld %
Actinium 228	0.203		0.209		0.203	30	01/09/12	02/01/12
Americium 241	-0.00112	U	0.122		0.0940	30	01/09/12	02/01/12
Bismuth 212	0.275	U	0.427		0.295	30	01/09/12	02/01/12
Bismuth 214	0.297		0.142		0.0675	30	01/09/12	02/01/12
Cesium 137	-0.00690	U	0.0759	0.0700	0.0454	30	01/09/12	02/01/12
Cobalt 60	-0.0166	U	24.8		0.0815	30	01/09/12	02/01/12
Europium 152	0.0664	U	0.104		0.107	30	01/09/12	02/01/12
Europium 154	0.0427	U	0.134		0.419	30	01/09/12	02/01/12
Lead 210	0.901	U	1.34	1.50	0.955	30	01/09/12	02/01/12
Lead 212	0.322		0.125		0.0608	30	01/09/12	02/01/12
Lead 214	0.241		0.149		0.101	30	01/09/12	02/01/12
Potassium 40	8.66		2.11		0.585	30	01/09/12	02/01/12
Protactinium 234	0.0236	U	0.132		0.107	30	01/09/12	02/01/12
Radium (226)	0.297	J	0.142	0.700	0.0675	30	01/09/12	02/01/12
Thallium 208	0.149		0.0702		0.0268	30	01/09/12	02/01/12
Thorium 232	0.203		0.209		0.203	30	01/09/12	02/01/12
Thorium 234	0.630	U	0.496		0.919	30	01/09/12	02/01/12
Uranium 235	0.0822	U	0.116		0.186	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

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J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-011

Radiochemistry

Lab Sample ID: F2A300427-009
 Work Order: MQGTV
 Matrix: SOLID

Date Collected: 12/14/11 1123
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.722		0.205		0.0674	30	01/09/12	02/01/12
Americium 241	0.00890	U	0.140		0.115	30	01/09/12	02/01/12
Bismuth 212	0.450		0.470		0.315	30	01/09/12	02/01/12
Bismuth 214	0.739		0.178		0.0376	30	01/09/12	02/01/12
Cesium 137	0.00678	U	0.0587	0.0700	0.0492	30	01/09/12	02/01/12
Cobalt 60	0.0107	U	0.0516		0.0398	30	01/09/12	02/01/12
Europium 152	0.0347	U	0.0471		0.133	30	01/09/12	02/01/12
Europium 154	0.0287	U	0.116		0.347	30	01/09/12	02/01/12
Lead 210	1.14	U	1.56	1.50	1.20	30	01/09/12	02/01/12
Lead 212	0.704		0.176		0.0752	30	01/09/12	02/01/12
Lead 214	0.887		0.200		0.0850	30	01/09/12	02/01/12
Potassium 40	13.4		2.43		0.296	30	01/09/12	02/01/12
Protactinium 234	-0.0938	U	0.217		0.173	30	01/09/12	02/01/12
Radium (226)	0.739		0.178	0.700	0.0376	30	01/09/12	02/01/12
Thallium 208	0.211		0.0900		0.0449	30	01/09/12	02/01/12
Thorium 232	0.722		0.205		0.0674	30	01/09/12	02/01/12
Thorium 234	2.15		1.48		0.911	30	01/09/12	02/01/12
Uranium 235	0.0306	U	0.0948		0.224	30	01/09/12	02/01/12

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-012

Radiochemistry

Lab Sample ID: F2A300427-010
 Work Order: MQGTW
 Matrix: SOLID

Date Collected: 12/14/11 1126
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	pCi/g	Batch #	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.582		0.206		0.147	30	01/09/12	02/01/12
Americium 241	0.00796	U	0.0938		0.0766	30	01/09/12	02/01/12
Bismuth 212	0.287	U	0.611		0.397	30	01/09/12	02/01/12
Bismuth 214	0.512		0.192		0.0881	30	01/09/12	02/01/12
Cesium 137	0.0194	U	0.0487	0.0700	0.0370	30	01/09/12	02/01/12
Cobalt 60	-0.00482	U	0.0670		0.0544	30	01/09/12	02/01/12
Europium 152	-0.0175	U	0.0602		0.122	30	01/09/12	02/01/12
Europium 154	0.0808	U	0.405		0.320	30	01/09/12	02/01/12
Lead 210	-0.476	U	2.92	1.50	1.34	30	01/09/12	02/01/12
Lead 212	0.513		0.153		0.0687	30	01/09/12	02/01/12
Lead 214	0.628		0.166		0.0724	30	01/09/12	02/01/12
Potassium 40	6.71		1.58		0.500	30	01/09/12	02/01/12
Protactinium 234	-0.0819	U	0.170		0.134	30	01/09/12	02/01/12
Radium (226)	0.512	J	0.192	0.700	0.0881	30	01/09/12	02/01/12
Thallium 208	0.0716		0.0871		0.0446	30	01/09/12	02/01/12
Thorium 232	0.582		0.206		0.147	30	01/09/12	02/01/12
Thorium 234	0.435	U	1.24		1.04	30	01/09/12	02/01/12
Uranium 235	0.00372	U	0.00705		0.202	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-013

Radiochemistry

Lab Sample ID: F2A300427-011

Work Order: MQGTX

Matrix: SOLID

Date Collected: 12/14/11 1129

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
					pCi/g		Batch # 2032029	Yld %
Actinium 228	1.29		0.314		0.0361	30	01/09/12	02/01/12
Americium 241	0.0267	U	0.133		0.108	30	01/09/12	02/01/12
Bismuth 212	0.443		0.443		0.315	30	01/09/12	02/01/12
Bismuth 214	0.851		0.203		0.0704	30	01/09/12	02/01/12
Cesium 137	0.0215	U	0.0572	0.0700	0.0444	30	01/09/12	02/01/12
Cobalt 60	0.0	U	0.0121		0.0750	30	01/09/12	02/01/12
Europium 152	0.0866	U	0.144		0.101	30	01/09/12	02/01/12
Europium 154	0.0311	U	0.0618		0.384	30	01/09/12	02/01/12
Lead 210	0.545	U	1.72	1.50	1.27	30	01/09/12	02/01/12
Lead 212	1.07		0.295		0.0887	30	01/09/12	02/01/12
Lead 214	0.904		0.219		0.0875	30	01/09/12	02/01/12
Potassium 40	7.87		1.62		0.332	30	01/09/12	02/01/12
Protactinium 234	0.0865	U	0.216		0.165	30	01/09/12	02/01/12
Radium (226)	0.851		0.203	0.700	0.0704	30	01/09/12	02/01/12
Thallium 208	0.408		0.107		0.0392	30	01/09/12	02/01/12
Thorium 232	1.29		0.314		0.0361	30	01/09/12	02/01/12
Thorium 234	3.25		1.87		1.03	30	01/09/12	02/01/12
Uranium 235	0.148	U	0.340		0.271	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-014

Radiochemistry

Lab Sample ID: F2A300427-012

Work Order: MQGTO

Matrix: SOLID

Date Collected: 12/14/11 1133

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.126	U	0.144		0.173	30	01/09/12	02/01/12
Americium 241	-0.0461	U	0.109		0.0862	30	01/09/12	02/01/12
Bismuth 212	0.398		0.423		0.291	30	01/09/12	02/01/12
Bismuth 214	0.548		0.175		0.0758	30	01/09/12	02/01/12
Cesium 137	-0.0000413	U	0.0589	0.0700	0.0485	30	01/09/12	02/01/12
Cobalt 60	-0.00726	U	0.0645		0.0520	30	01/09/12	02/01/12
Europium 152	0.0654	U	0.0867		0.125	30	01/09/12	02/01/12
Europium 154	0.105	U	0.206		0.235	30	01/09/12	02/01/12
Lead 210	1.59		1.82	1.50	1.16	30	01/09/12	02/01/12
Lead 212	0.451		0.117		0.0527	30	01/09/12	02/01/12
Lead 214	0.370		0.142		0.0893	30	01/09/12	02/01/12
Potassium 40	7.67		1.64		0.578	30	01/09/12	02/01/12
Protactinium 234	0.0676	U	0.203		0.131	30	01/09/12	02/01/12
Radium (226)	0.548	J	0.175	0.700	0.0758	30	01/09/12	02/01/12
Thallium 208	0.0816		0.0679		0.0502	30	01/09/12	02/01/12
Thorium 232	0.126	U	0.144		0.173	30	01/09/12	02/01/12
Thorium 234	0.881		0.641		0.756	30	01/09/12	02/01/12
Uranium 235	-0.0652	U	2.61		0.267	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-015

Radiochemistry

Lab Sample ID: F2A300427-013
 Work Order: MQGT1
 Matrix: SOLID

Date Collected: 12/14/11 1136
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	pCi/g	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD									
Actinium 228	0.116	U	0.208		0.180	30	01/09/12	02/01/12	
Americium 241	-0.0190	U	0.106		0.0859	30	01/09/12	02/01/12	
Bismuth 212	0.237	U	0.436		0.325	30	01/09/12	02/01/12	
Bismuth 214	0.607		0.164		0.0692	30	01/09/12	02/01/12	
Cesium 137	0.0183	U	0.0527	0.0700	0.0406	30	01/09/12	02/01/12	
Cobalt 60	0.0	U	0.0137		0.0609	30	01/09/12	02/01/12	
Europium 152	0.0696	U	0.130		0.0895	30	01/09/12	02/01/12	
Europium 154	0.0391	U	0.115		0.382	30	01/09/12	02/01/12	
Lead 210	2.11		1.76	1.50	1.11	30	01/09/12	02/01/12	
Lead 212	0.427		0.157		0.0790	30	01/09/12	02/01/12	
Lead 214	0.537		0.155		0.0931	30	01/09/12	02/01/12	
Potassium 40	4.37		1.35		0.606	30	01/09/12	02/01/12	
Protactinium 234	0.121	U	0.205		0.127	30	01/09/12	02/01/12	
Radium (226)	0.607	J	0.164	0.700	0.0692	30	01/09/12	02/01/12	
Thallium 208	0.116		0.0791		0.0434	30	01/09/12	02/01/12	
Thorium 232	0.116	U	0.208		0.180	30	01/09/12	02/01/12	
Thorium 234	0.434	U	0.434		0.999	30	01/09/12	02/01/12	
Uranium 235	0.101	U	0.234		0.189	30	01/09/12	02/01/12	

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-016

Radiochemistry

Lab Sample ID: F2A300427-014
 Work Order: MQGT2
 Matrix: SOLID

Date Collected: 12/14/11 1139
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.352		0.254		0.194	30	01/09/12	02/01/12
Americium 241	-0.0155	U	0.369		0.0930	30	01/09/12	02/01/12
Bismuth 212	0.629		0.636		0.330	30	01/09/12	02/01/12
Bismuth 214	0.480		0.188		0.0751	30	01/09/12	02/01/12
Cesium 137	0.00251	U	0.0681	0.0700	0.0608	30	01/09/12	02/01/12
Cobalt 60	-0.0174	U	3.52		0.0770	30	01/09/12	02/01/12
Europium 152	0.0904	U	0.145		0.135	30	01/09/12	02/01/12
Europium 154	0.0	U	0.121		0.412	30	01/09/12	02/01/12
Lead 210	0.230	U	1.32	1.50	1.16	30	01/09/12	02/01/12
Lead 212	0.551		0.152		0.0522	30	01/09/12	02/01/12
Lead 214	0.498		0.146		0.0456	30	01/09/12	02/01/12
Potassium 40	5.76		1.80		0.641	30	01/09/12	02/01/12
Protactinium 234	-0.0255	U	0.0500		0.141	30	01/09/12	02/01/12
Radium (226)	0.480	J	0.188	0.700	0.0751	30	01/09/12	02/01/12
Thallium 208	0.174		0.0772		0.0292	30	01/09/12	02/01/12
Thorium 232	0.352		0.254		0.194	30	01/09/12	02/01/12
Thorium 234	0.454	U	0.598		0.835	30	01/09/12	02/01/12
Uranium 235	0.0	U	0.159		0.212	30	01/09/12	02/01/12

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-017

Radiochemistry

Lab Sample ID: F2A300427-015

Work Order: MQGT3

Matrix: SOLID

Date Collected: 12/14/11 1142

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	pCi/g	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD									
Actinium 228	0.388		0.248			0.193	30	01/09/12	02/01/12
Americium 241	0.0610	U	0.102			0.0783	30	01/09/12	02/01/12
Bismuth 212	0.220	U	0.534			0.405	30	01/09/12	02/01/12
Bismuth 214	0.565		0.168			0.0455	30	01/09/12	02/01/12
Cesium 137	0.0165	U	0.0563	0.0700	0.0460		30	01/09/12	02/01/12
Cobalt 60	0.0137	U	0.0366			0.0849	30	01/09/12	02/01/12
Europium 152	0.0236	U	0.104			0.142	30	01/09/12	02/01/12
Europium 154	0.171	U	0.491			0.371	30	01/09/12	02/01/12
Lead 210	1.00	U	1.36	1.50	1.03		30	01/09/12	02/01/12
Lead 212	0.589		0.198			0.0861	30	01/09/12	02/01/12
Lead 214	0.546		0.159			0.0708	30	01/09/12	02/01/12
Potassium 40	4.61		1.61			0.697	30	01/09/12	02/01/12
Protactinium 234	0.258		0.316			0.135	30	01/09/12	02/01/12
Radium (226)	0.565	J	0.168	0.700	0.0455		30	01/09/12	02/01/12
Thallium 208	0.107		0.0827			0.0523	30	01/09/12	02/01/12
Thorium 232	0.388		0.248			0.193	30	01/09/12	02/01/12
Thorium 234	1.32		0.809			0.890	30	01/09/12	02/01/12
Uranium 235	0.0396	U	0.107			0.273	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-018

Radiochemistry

Lab Sample ID: F2A300427-016
 Work Order: MQGT5
 Matrix: SOLID

Date Collected: 12/14/11 1145
 Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
				pCi/g		Batch # 2032029		Yld %
Actinium 228	1.11		0.289		0.0380	30	01/09/12	02/01/12
Americium 241	-0.0620	U	0.137		0.109	30	01/09/12	02/01/12
Bismuth 212	0.780		0.619		0.309	30	01/09/12	02/01/12
Bismuth 214	0.869		0.198		0.0651	30	01/09/12	02/01/12
Cesium 137	0.0129	U	0.0591	0.0700	0.0471	30	01/09/12	02/01/12
Cobalt 60	0.000816	U	0.0464		0.0381	30	01/09/12	02/01/12
Europium 152	0.0722	U	0.128		0.117	30	01/09/12	02/01/12
Europium 154	-0.0106	U	0.432		0.354	30	01/09/12	02/01/12
Lead 210	2.13		1.91	1.50	1.34	30	01/09/12	02/01/12
Lead 212	0.928		0.198		0.0807	30	01/09/12	02/01/12
Lead 214	0.844		0.191		0.0716	30	01/09/12	02/01/12
Potassium 40	8.81		1.75		0.296	30	01/09/12	02/01/12
Protactinium 234	0.0938	U	0.251		0.140	30	01/09/12	02/01/12
Radium (226)	0.869		0.198	0.700	0.0651	30	01/09/12	02/01/12
Thallium 208	0.266		0.103		0.0434	30	01/09/12	02/01/12
Thorium 232	1.11		0.289		0.0380	30	01/09/12	02/01/12
Thorium 234	0.651	U	0.694		1.00	30	01/09/12	02/01/12
Uranium 235	0.120	U	0.217		0.218	30	01/09/12	02/01/12

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-019

Radiochemistry

Lab Sample ID: F2A300427-017

Work Order: MQGT6

Matrix: SOLID

Date Collected: 12/14/11 1148

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	0.764		0.241		0.0662	30	01/09/12	02/01/12
Americium 241	0.0657	U	0.136		0.108	30	01/09/12	02/01/12
Bismuth 212	0.259	U	0.407		0.306	30	01/09/12	02/01/12
Bismuth 214	0.581		0.180		0.0801	30	01/09/12	02/01/12
Cesium 137	0.0551	J	0.0572	0.0700	0.0395	30	01/09/12	02/01/12
Cobalt 60	0.0	U	0.0178		0.0559	30	01/09/12	02/01/12
Europium 152	0.0542	U	0.154		0.0761	30	01/09/12	02/01/12
Europium 154	0.0142	U	0.0327		0.259	30	01/09/12	02/01/12
Lead 210	1.54		1.59	1.50	1.08	30	01/09/12	02/01/12
Lead 212	0.617		0.162		0.0718	30	01/09/12	02/01/12
Lead 214	0.688		0.167		0.0788	30	01/09/12	02/01/12
Potassium 40	8.67		1.77		0.461	30	01/09/12	02/01/12
Protactinium 234	0.123	U	0.154		0.134	30	01/09/12	02/01/12
Radium (226)	0.581	J	0.180	0.700	0.0801	30	01/09/12	02/01/12
Thallium 208	0.251		0.0872		0.0375	30	01/09/12	02/01/12
Thorium 232	0.764		0.241		0.0662	30	01/09/12	02/01/12
Thorium 234	0.362	U	0.505		1.07	30	01/09/12	02/01/12
Uranium 235	-0.0476	U	1.90		0.288	30	01/09/12	02/01/12

NOTE (S)

Data are incomplete without the case narrative.
Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-020

Radiochemistry

Lab Sample ID: F2A300427-018

Work Order: MQGT7

Matrix: SOLID

Date Collected: 12/14/11 1151

Date Received: 01/30/12 1040

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Gamma Ra-226 & hits by EPA 901.1 MOD								
Actinium 228	1.65		0.293		0.0630	30	01/09/12	02/01/12
Americium 241	-0.00279	U	0.158		0.130	30	01/09/12	02/01/12
Bismuth 212	1.58		0.717		0.286	30	01/09/12	02/01/12
Bismuth 214	1.24		0.258		0.0792	30	01/09/12	02/01/12
Cesium 137	0.00672	U	0.0541	0.0700	0.0437	30	01/09/12	02/01/12
Cobalt 60	0.00386	U	0.0524		0.0425	30	01/09/12	02/01/12
Europium 152	0.000926	U	0.148		0.122	30	01/09/12	02/01/12
Europium 154	0.0631	U	0.230		0.311	30	01/09/12	02/01/12
Lead 210	2.53		2.41	1.50	1.49	30	01/09/12	02/01/12
Lead 212	1.38		0.365		0.0964	30	01/09/12	02/01/12
Lead 214	1.04		0.231		0.0699	30	01/09/12	02/01/12
Potassium 40	7.48		1.56		0.325	30	01/09/12	02/01/12
Protactinium 234	-0.0609	U	0.231		0.187	30	01/09/12	02/01/12
Radium (226)	1.24		0.258	0.700	0.0792	30	01/09/12	02/01/12
Thallium 208	0.398		0.102		0.0448	30	01/09/12	02/01/12
Thorium 232	1.65		0.293		0.0630	30	01/09/12	02/01/12
Thorium 234	1.67		1.61		1.28	30	01/09/12	02/01/12
Uranium 235	0.119	U	0.314		0.282	30	01/09/12	02/01/12

NOTE(S)

Data are incomplete without the case narrative.
Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-015

Radiochemistry

Lab Sample ID: F2A300436-001 Date Collected: 12/14/11 1136
 Work Order: MQG2M Date Received: 01/30/12 1040
 Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Total SR BY GFPC EPA-905 MOD			pCi/g			Batch # 2031068		Yld % 81.
Strontium Total	0.113	U	0.152	0.320	0.141	400	01/31/12	02/12/12

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech EC, Inc.

Client Sample ID: 02-PCT-232-018

Radiochemistry

Lab Sample ID: F2A300436-002

Date Collected: 12/14/11 1145

Work Order: MQG2P

Date Received: 01/30/12 1040

Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDL	Count Time	Prep Date	Analysis Date
Total SR BY GFPC EPA-905 MOD			pCi/g			Batch # 2031068		Yld % 86.
Strontium Total	-0.00446	U	0.137	0.320	0.135	400	01/31/12	02/12/12

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

ATTACHMENT 3

BACKFILL MATERIAL
RESRAD REPORT
(on CD only)

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Summary : RESRAD Default Parameters

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current	Base	Parameter
		Value#	Case*	Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
A-1	Sr-90 (Source: FGR 12)	7.043E-04	7.043E-04	DCF1(3)
A-1	Y-90 (Source: FGR 12)	2.391E-02	2.391E-02	DCF1(4)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
B-1	Sr-90+D	1.308E-03	1.300E-03	DCF2(2)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-1	Sr-90+D	1.528E-04	1.420E-04	DCF3(2)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-34				
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(2,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(2,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(2,3)
D-34				
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(2,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(2,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Site-Specific Parameter Summary

Menu	Parameter	User		Used by RESRAD	Parameter
		Input	Default	(If different from user input)	Name
R011	Area of contaminated zone (m**2)	9.330E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.000E-02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Sr-90	1.520E-01	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(2)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User		Used by RESRAD	Parameter
		Input	Default	(If different from user input)	Name
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.623E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.516E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.467E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.466E-01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.466E-01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)

Summary : RESRAD Default Parameters

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evaporation layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evaporation flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evaporation flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User		Used by RESRAD	Parameter Name
		Input	Default	(If different from user input)	
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area:	933.00 square meters	Cs-137	4.000E-02
Thickness:	2.00 meters	Sr-90	1.520E-01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	6.535E-01	6.351E-01	5.998E-01	4.912E-01	2.778E-01	3.842E-02	2.061E-04	7.834E-12
M(t):	2.614E-02	2.540E-02	2.399E-02	1.965E-02	1.111E-02	1.537E-03	8.246E-06	3.134E-13

Maximum TDOSE(t): 6.535E-01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.165E-02	0.1096	6.311E-08	0.0000	0.000E+00	0.0000	6.419E-03	0.0098	5.613E-04	0.0009	1.833E-04	0.0003	5.050E-05	0.0001
Sr-90	1.972E-03	0.0030	9.807E-06	0.0000	0.000E+00	0.0000	5.575E-01	0.8530	1.126E-02	0.0172	3.342E-03	0.0051	5.846E-04	0.0009
Total	7.362E-02	0.1127	9.870E-06	0.0000	0.000E+00	0.0000	5.639E-01	0.8629	1.182E-02	0.0181	3.525E-03	0.0054	6.351E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	7.887E-02	0.1207										
Sr-90	0.000E+00	0.0000	5.746E-01	0.8793										
Total	0.000E+00	0.0000	6.535E-01	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Cs-137	7.001E-02	0.1102	6.167E-08	0.0000	0.000E+00	0.0000	6.272E-03	0.0099	5.485E-04	0.0009	1.791E-04	0.0003	4.934E-05	0.0001
Sr-90	1.915E-03	0.0030	9.524E-06	0.0000	0.000E+00	0.0000	5.414E-01	0.8524	1.093E-02	0.0172	3.246E-03	0.0051	5.677E-04	0.0009
Total	7.193E-02	0.1133	9.585E-06	0.0000	0.000E+00	0.0000	5.476E-01	0.8623	1.148E-02	0.0181	3.425E-03	0.0054	6.170E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	Nuclide	mrem/yr	fract.	mrem/yr										
Cs-137	0.000E+00	0.0000	7.706E-02	0.1213										
Sr-90	0.000E+00	0.0000	5.580E-01	0.8787										
Total	0.000E+00	0.0000	6.351E-01	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.685E-02	0.1114	5.888E-03	0.0000	0.000E+00	0.0000	5.989E-03	0.0100	5.237E-04	0.0009	1.710E-04	0.0003	4.711E-05	0.0001
Sr-90	1.806E-03	0.0030	8.981E-06	0.0000	0.000E+00	0.0000	5.105E-01	0.8511	1.031E-02	0.0172	3.061E-03	0.0051	5.354E-04	0.0009
Total	6.865E-02	0.1145	9.040E-06	0.0000	0.000E+00	0.0000	5.165E-01	0.8611	1.083E-02	0.0181	3.232E-03	0.0054	5.825E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	7.358E-02	0.1227										
Sr-90	0.000E+00	0.0000	5.263E-01	0.8773										
Total	0.000E+00	0.0000	5.998E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground	Inhalation		Radon		Plant		Meat		Milk		Soil		
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.685E-02	0.1157	5.008E-08	0.0000	0.000E+00	0.0000	5.093E-03	0.0104	4.454E-04	0.0009	1.454E-04	0.0003	4.006E-05	0.0001
Sr-90	1.471E-03	0.0030	7.315E-06	0.0000	0.000E+00	0.0000	4.158E-01	0.8465	8.397E-03	0.0171	2.493E-03	0.0051	4.360E-04	0.0009
Total	5.832E-02	0.1187	7.365E-06	0.0000	0.000E+00	0.0000	4.209E-01	0.8569	8.843E-03	0.0180	2.638E-03	0.0054	4.761E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water	Fish		Radon		Plant		Meat		Milk		All Pathways*		
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	6.257E-02	0.1274										
Sr-90	0.000E+00	0.0000	4.286E-01	0.8726										
Total	0.000E+00	0.0000	4.912E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	3.579E-02	0.1288	3.152E-08	0.0000	0.000E+00	0.0000	3.206E-03	0.0115	2.804E-04	0.0010	9.155E-05	0.0003	2.522E-05	0.0001
Sr-90	8.184E-04	0.0029	4.069E-06	0.0000	0.000E+00	0.0000	2.313E-01	0.8326	4.672E-03	0.0168	1.387E-03	0.0050	2.426E-04	0.0009
Total	3.661E-02	0.1317	4.101E-06	0.0000	0.000E+00	0.0000	2.345E-01	0.8441	4.952E-03	0.0178	1.478E-03	0.0053	2.678E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	3.939E-02	0.1418										
Sr-90	0.000E+00	0.0000	2.385E-01	0.8582										
Total	0.000E+00	0.0000	2.778E-01	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.083E-03	0.1844	6.239E-09	0.0000	0.000E+00	0.0000	6.346E-04	0.0165	5.549E-05	0.0014	1.812E-05	0.0005	4.992E-06	0.0001
Sr-90	1.051E-04	0.0027	5.227E-07	0.0000	0.000E+00	0.0000	2.971E-02	0.7733	6.000E-04	0.0156	1.781E-04	0.0046	3.116E-05	0.0008
Total	7.188E-03	0.1871	5.289E-07	0.0000	0.000E+00	0.0000	3.034E-02	0.7898	6.555E-04	0.0171	1.962E-04	0.0051	3.615E-05	0.0009

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	7.796E-03	0.2029										
Sr-90	0.000E+00	0.0000	3.062E-02	0.7971										
Total	0.000E+00	0.0000	3.842E-02	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground	Inhalation		Radon		Plant		Meat		Milk		Soil		
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.922E-05	0.3358	6.097E-11	0.0000	0.000E+00	0.0000	6.201E-06	0.0301	5.423E-07	0.0026	1.771E-07	0.0009	4.878E-08	0.0002
Sr-90	2.985E-07	0.0014	1.484E-09	0.0000	0.000E+00	0.0000	8.438E-05	0.4094	1.704E-06	0.0083	5.059E-07	0.0025	8.849E-08	0.0004
Total	6.951E-05	0.3372	1.545E-09	0.0000	0.000E+00	0.0000	9.058E-05	0.4394	2.246E-06	0.0109	6.830E-07	0.0033	1.373E-07	0.0007

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water	Fish		Radon		Plant		Meat		Milk		All Pathways*		
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	7.619E-05	0.3696										
Sr-90	3.941E-05	0.1912	1.999E-08	0.0001	0.000E+00	0.0000	3.048E-06	0.0148	3.166E-07	0.0015	1.728E-07	0.0008	1.300E-04	0.6304
Total	3.941E-05	0.1912	1.999E-08	0.0001	0.000E+00	0.0000	3.048E-06	0.0148	3.166E-07	0.0015	1.728E-07	0.0008	2.061E-04	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Cs-137	6.385E-12	0.8150	5.624E-18	0.0000	0.000E+00	0.0000	5.720E-13	0.0730	5.002E-14	0.0064	1.633E-14	0.0021	4.500E-15	0.0006
Sr-90	3.645E-16	0.0000	1.813E-18	0.0000	0.000E+00	0.0000	1.030E-13	0.0132	2.081E-15	0.0003	6.177E-16	0.0001	1.080E-16	0.0000
Total	6.385E-12	0.8150	7.437E-18	0.0000	0.000E+00	0.0000	6.751E-13	0.0862	5.210E-14	0.0067	1.695E-14	0.0022	4.608E-15	0.0006

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	Nuclide	mrem/yr	fract.	mrem/yr										
Cs-137	0.000E+00	0.0000	7.028E-12	0.8971										
Sr-90	6.422E-13	0.0820	3.259E-16	0.0000	0.000E+00	0.0000	4.968E-14	0.0063	5.169E-15	0.0007	2.818E-15	0.0004	8.064E-13	0.1029
Total	6.422E-13	0.0820	3.259E-16	0.0000	0.000E+00	0.0000	4.968E-14	0.0063	5.169E-15	0.0007	2.818E-15	0.0004	7.834E-12	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Thread	DSR(i,j,t) At Time in Years (mrem/yr)/(pCi/g)							
(i)	(j)	Fraction	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137+D	Cs-137+D	1.000E+00	1.972E+00	1.927E+00	1.839E+00	1.564E+00	9.848E-01	1.949E-01	1.905E-03	1.757E-10
Sr-90+D	Sr-90+D	1.000E+00	3.780E+00	3.671E+00	3.462E+00	2.820E+00	1.569E+00	2.015E-01	8.550E-04	5.306E-12

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide

(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	1.268E+01	1.298E+01	1.359E+01	1.598E+01	2.539E+01	1.283E+02	1.313E+04	1.423E+11
Sr-90	6.613E+00	6.810E+00	7.221E+00	8.866E+00	1.594E+01	1.241E+02	2.924E+04	4.712E+12

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)
(i)	(pCi/g)	(years)		(pCi/g)		(pCi/g)
Cs-137	4.000E-02	0.000E+00	1.972E+00	1.268E+01	1.972E+00	1.268E+01
Sr-90	1.520E-01	0.000E+00	3.780E+00	6.613E+00	3.780E+00	6.613E+00

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)	DOSE(j,t), mrem/yr							
(j)	(i)		t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	Cs-137	1.000E+00	7.887E-02	7.706E-02	7.358E-02	6.257E-02	3.939E-02	7.796E-03	7.619E-05	7.028E-12
Sr-90	Sr-90	1.000E+00	5.746E-01	5.580E-01	5.263E-01	4.286E-01	2.385E-01	3.062E-02	1.300E-04	8.064E-13

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)	S(j,t), pCi/g							
(j)	(i)		t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	Cs-137	1.000E+00	4.000E-02	3.908E-02	3.732E-02	3.174E-02	1.998E-02	3.954E-03	3.864E-05	3.564E-12
Sr-90	Sr-90	1.000E+00	1.520E-01	1.476E-01	1.392E-01	1.134E-01	6.307E-02	8.101E-03	2.301E-05	2.809E-14

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 0.49 seconds

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Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors	2
Risk Slope and ETRG for the Ground Pathway	3
Amount of Intake Quantities and Excess Cancer Risks	
Time= 0.000E+00	4
Time= 1.000E+00	6
Time= 3.000E+00	8
Time= 1.000E+01	10
Time= 3.000E+01	12
Time= 1.000E+02	14
Time= 3.000E+02	16
Time= 1.000E+03	18

Intrinsic : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Cancer Risk Slope Factors Summary Table

Risk Library: FGR 13 Morbidity

Menu	Parameter	Current	Base	Parameter
		Value	Case*	Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Cs-137+D	2.55E-06	5.32E-10	SLPF(1,1)
Sf-1	Sr-90+D	1.96E-08	4.82E-10	SLPF(2,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Cs-137+D	1.12E-10	1.12E-10	SLPF(1,2)
Sf-2	Sr-90+D	4.33E-10	4.25E-10	SLPF(2,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.74E-11	3.74E-11	SLPF(1,3)
Sf-3	Sr-90+D	9.53E-11	6.88E-11	SLPF(2,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.04E-11	3.04E-11	SLPF(1,4)
Sf-3	Sr-90+D	7.40E-11	5.59E-11	SLPF(2,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.74E-11	3.74E-11	SLPF(1,5)
Sf-3	Sr-90+D	9.53E-11	6.88E-11	SLPF(2,5)

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Intrinsic : RESRAD Default Parameters

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Risk Slope and Environmental Transport Factors for the Ground Pathway

Nuclide	Slope(i)*	ETFG(i,t) At Time in Years (dimensionless)							
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Ba-137m	2.690E-06	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01
Cs-137	5.320E-10	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01
Sr-90	4.820E-10	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01
Y-90	1.910E-08	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01

* - Units are 1/yr per (pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.001E-03	1.299E+02	1.136E+01	3.708E+00	1.022E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.460E+02
Sr-90	7.606E-03	3.701E+03	7.469E+01	2.218E+01	3.882E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.802E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.170E-06	0.1368	4.849E-12	0.0000	1.051E-07	0.0123	9.187E-09	0.0011	3.000E-09	0.0004	8.265E-10	0.0001
Sr-90	3.177E-08	0.0037	6.578E-11	0.0000	7.040E-06	0.8233	1.422E-07	0.0166	4.220E-08	0.0049	7.383E-09	0.0009
Total	1.201E-06	0.1405	7.062E-11	0.0000	7.145E-06	0.8356	1.513E-07	0.0177	4.520E-08	0.0053	8.209E-09	0.0010

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.288E-06	0.1506								
Sr-90	0.000E+00	0.0000	7.264E-06	0.8494								
Total	0.000E+00	0.0000	8.551E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.170E-06	0.1368	4.849E-12	0.0000	0.000E+00	0.0000	1.051E-07	0.0123	9.187E-09	0.0011	3.000E-09	0.0004	8.265E-10	0.0001
Sr-90	3.177E-08	0.0037	6.578E-11	0.0000	0.000E+00	0.0000	7.040E-06	0.8233	1.422E-07	0.0166	4.220E-08	0.0049	7.383E-09	0.0009
Total	1.201E-06	0.1405	7.062E-11	0.0000	0.000E+00	0.0000	7.145E-06	0.8356	1.513E-07	0.0177	4.520E-08	0.0053	8.209E-09	0.0010

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.288E-06	0.1506										
Sr-90	0.000E+00	0.0000	7.264E-06	0.8494										
Total	0.000E+00	0.0000	8.551E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.956E-03	1.269E+02	1.110E+01	3.624E+00	9.983E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.426E+02
Sr-90	7.386E-03	3.595E+03	7.260E+01	2.155E+01	3.770E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.693E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.143E-06	0.1375	4.738E-12	0.0000	1.027E-07	0.0124	8.977E-09	0.0011	2.931E-09	0.0004	8.076E-10	0.0001
Sr-90	3.085E-08	0.0037	6.387E-11	0.0000	6.837E-06	0.8225	1.381E-07	0.0166	4.099E-08	0.0049	7.169E-09	0.0009
Total	1.174E-06	0.1412	6.861E-11	0.0000	6.939E-06	0.8349	1.470E-07	0.0177	4.392E-08	0.0053	7.977E-09	0.0010

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.258E-06	0.1514								
Sr-90	0.000E+00	0.0000	7.054E-06	0.8486								
Total	0.000E+00	0.0000	8.312E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.143E-06	0.1375	4.738E-12	0.0000	0.000E+00	0.0000	1.027E-07	0.0124	8.977E-09	0.0011	2.931E-09	0.0004	8.076E-10	0.0001
Sr-90	3.085E-08	0.0037	6.387E-11	0.0000	0.000E+00	0.0000	6.837E-06	0.8225	1.381E-07	0.0166	4.099E-08	0.0049	7.169E-09	0.0009
Total	1.174E-06	0.1412	6.861E-11	0.0000	0.000E+00	0.0000	6.939E-06	0.8349	1.470E-07	0.0177	4.392E-08	0.0053	7.977E-09	0.0010

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.258E-06	0.1514										
Sr-90	0.000E+00	0.0000	7.054E-06	0.8486										
Total	0.000E+00	0.0000	8.312E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.867E-03	1.212E+02	1.060E+01	3.460E+00	9.531E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.362E+02
Sr-90	6.965E-03	3.390E+03	6.847E+01	2.033E+01	3.555E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.483E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.091E-06	0.1389	4.524E-12	0.0000	9.802E-08	0.0125	8.571E-09	0.0011	2.799E-09	0.0004	7.710E-10	0.0001
Sr-90	2.909E-08	0.0037	6.024E-11	0.0000	6.447E-06	0.8210	1.302E-07	0.0166	3.865E-08	0.0049	6.761E-09	0.0009
Total	1.120E-06	0.1426	6.476E-11	0.0000	6.545E-06	0.8334	1.388E-07	0.0177	4.145E-08	0.0053	7.532E-09	0.0010

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.201E-06	0.1530								
Sr-90	0.000E+00	0.0000	6.652E-06	0.8470								
Total	0.000E+00	0.0000	7.853E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.091E-06	0.1389	4.524E-12	0.0000	0.000E+00	0.0000	9.802E-08	0.0125	8.571E-09	0.0011	2.799E-09	0.0004	7.710E-10	0.0001
Sr-90	2.909E-08	0.0037	6.024E-11	0.0000	0.000E+00	0.0000	6.447E-06	0.8210	1.302E-07	0.0166	3.865E-08	0.0049	6.761E-09	0.0009
Total	1.120E-06	0.1426	6.476E-11	0.0000	0.000E+00	0.0000	6.545E-06	0.8334	1.388E-07	0.0177	4.145E-08	0.0053	7.532E-09	0.0010

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.201E-06	0.1530										
Sr-90	0.000E+00	0.0000	6.652E-06	0.8470										
Total	0.000E+00	0.0000	7.853E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.588E-03	1.030E+02	9.011E+00	2.942E+00	8.106E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.158E+02
Sr-90	5.673E-03	2.761E+03	5.577E+01	1.655E+01	2.896E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.837E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	9.279E-07	0.1441	3.847E-12	0.0000	8.336E-08	0.0129	7.289E-09	0.0011	2.380E-09	0.0004	6.557E-10	0.0001
Sr-90	2.370E-08	0.0037	4.906E-11	0.0000	5.251E-06	0.8154	1.060E-07	0.0165	3.148E-08	0.0049	5.507E-09	0.0009
Total	9.516E-07	0.1478	5.291E-11	0.0000	5.334E-06	0.8284	1.133E-07	0.0176	3.386E-08	0.0053	6.162E-09	0.0010

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.022E-06	0.1587								
Sr-90	0.000E+00	0.0000	5.418E-06	0.8413								
Total	0.000E+00	0.0000	6.440E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	9.279E-07	0.1441	3.847E-12	0.0000	0.000E+00	0.0000	8.336E-08	0.0129	7.289E-09	0.0011	2.380E-09	0.0004	6.557E-10	0.0001
Sr-90	2.370E-08	0.0037	4.906E-11	0.0000	0.000E+00	0.0000	5.251E-06	0.8154	1.060E-07	0.0165	3.148E-08	0.0049	5.507E-09	0.0009
Total	9.516E-07	0.1478	5.291E-11	0.0000	0.000E+00	0.0000	5.334E-06	0.8284	1.133E-07	0.0176	3.386E-08	0.0053	6.162E-09	0.0010

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	1.022E-06	0.1587										
Sr-90	0.000E+00	0.0000	5.418E-06	0.8413										
Total	0.000E+00	0.0000	6.440E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	9.997E-04	6.487E+01	5.672E+00	1.852E+00	5.103E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.290E+01
Sr-90	3.156E-03	1.536E+03	3.102E+01	9.210E+00	1.611E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.578E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	5.841E-07	0.1597	2.422E-12	0.0000	5.248E-08	0.0143	4.589E-09	0.0013	1.498E-09	0.0004	4.128E-10	0.0001
Sr-90	1.318E-08	0.0036	2.729E-11	0.0000	2.921E-06	0.7988	5.900E-08	0.0161	1.751E-08	0.0048	3.063E-09	0.0008
Total	5.973E-07	0.1633	2.972E-11	0.0000	2.974E-06	0.8131	6.359E-08	0.0174	1.901E-08	0.0052	3.476E-09	0.0010

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	6.431E-07	0.1758								
Sr-90	0.000E+00	0.0000	3.014E-06	0.8242								
Total	0.000E+00	0.0000	3.657E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	5.841E-07	0.1597	2.422E-12	0.0000	0.000E+00	0.0000	5.248E-08	0.0143	4.589E-09	0.0013	1.498E-09	0.0004	4.128E-10	0.0001
Sr-90	1.318E-08	0.0036	2.729E-11	0.0000	0.000E+00	0.0000	2.921E-06	0.7988	5.900E-08	0.0161	1.751E-08	0.0048	3.063E-09	0.0008
Total	5.973E-07	0.1633	2.972E-11	0.0000	0.000E+00	0.0000	2.974E-06	0.8131	6.359E-08	0.0174	1.901E-08	0.0052	3.476E-09	0.0010

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	6.431E-07	0.1758										
Sr-90	0.000E+00	0.0000	3.014E-06	0.8242										
Total	0.000E+00	0.0000	3.657E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.979E-04	1.284E+01	1.123E+00	3.666E-01	1.010E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.443E+01
Sr-90	4.053E-04	1.973E+02	3.984E+00	1.183E+00	2.069E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.027E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.156E-07	0.2248	4.793E-13	0.0000	1.039E-08	0.0202	9.082E-10	0.0018	2.966E-10	0.0006	8.170E-11	0.0002
Sr-90	1.693E-09	0.0033	3.505E-12	0.0000	3.752E-07	0.7294	7.577E-09	0.0147	2.249E-09	0.0044	3.934E-10	0.0008
Total	1.173E-07	0.2280	3.985E-12	0.0000	3.856E-07	0.7496	8.485E-09	0.0165	2.546E-09	0.0049	4.751E-10	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.273E-07	0.2474								
Sr-90	0.000E+00	0.0000	3.871E-07	0.7526								
Total	0.000E+00	0.0000	5.144E-07	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.156E-07	0.2248	4.793E-13	0.0000	0.000E+00	0.0000	1.039E-08	0.0202	9.082E-10	0.0018	2.966E-10	0.0006	8.170E-11	0.0002
Sr-90	1.693E-09	0.0033	3.505E-12	0.0000	0.000E+00	0.0000	3.752E-07	0.7294	7.577E-09	0.0147	2.249E-09	0.0044	3.934E-10	0.0008
Total	1.173E-07	0.2280	3.985E-12	0.0000	0.000E+00	0.0000	3.856E-07	0.7496	8.485E-09	0.0165	2.546E-09	0.0049	4.751E-10	0.0009

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.273E-07	0.2474										
Sr-90	0.000E+00	0.0000	3.871E-07	0.7526										
Total	0.000E+00	0.0000	5.144E-07	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.933E-06	1.255E-01	1.097E-02	3.582E-03	9.869E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.410E-01
Sr-90	1.151E-06	5.604E-01	1.132E-02	3.360E-03	5.876E-04	2.602E-01	1.320E-04	2.012E-02	2.090E-03	1.141E-03	8.593E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.130E-09	0.3976	4.684E-15	0.0000	1.015E-10	0.0357	8.875E-12	0.0031	2.898E-12	0.0010	7.984E-13	0.0003
Sr-90	4.809E-12	0.0017	9.956E-15	0.0000	1.066E-09	0.3750	2.152E-11	0.0076	6.389E-12	0.0022	1.117E-12	0.0004
Total	1.135E-09	0.3993	1.464E-14	0.0000	1.167E-09	0.4107	3.040E-11	0.0107	9.287E-12	0.0033	1.916E-12	0.0007

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.244E-09	0.4377								
Sr-90	4.465E-10	0.1571	2.917E-13	0.0001	4.446E-11	0.0156	4.620E-12	0.0016	2.522E-12	0.0009	1.598E-09	0.5623
Total	4.465E-10	0.1571	2.917E-13	0.0001	4.446E-11	0.0156	4.620E-12	0.0016	2.522E-12	0.0009	2.842E-09	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.130E-09	0.3976	4.684E-15	0.0000	0.000E+00	0.0000	1.015E-10	0.0357	8.875E-12	0.0031	2.898E-12	0.0010	7.984E-13	0.0003
Sr-90	4.809E-12	0.0017	9.956E-15	0.0000	0.000E+00	0.0000	1.066E-09	0.3750	2.152E-11	0.0076	6.389E-12	0.0022	1.117E-12	0.0004
Total	1.135E-09	0.3993	1.464E-14	0.0000	0.000E+00	0.0000	1.167E-09	0.4107	3.040E-11	0.0107	9.287E-12	0.0033	1.916E-12	0.0007

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.244E-09	0.4377										
Sr-90	4.465E-10	0.1571	2.917E-13	0.0001	0.000E+00	0.0000	4.446E-11	0.0156	4.620E-12	0.0016	2.522E-12	0.0009	1.598E-09	0.5623
Total	4.465E-10	0.1571	2.917E-13	0.0001	0.000E+00	0.0000	4.446E-11	0.0156	4.620E-12	0.0016	2.522E-12	0.0009	2.842E-09	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.784E-13	1.157E-08	1.012E-09	3.305E-10	9.104E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.301E-08
Sr-90	1.406E-15	6.843E-10	1.382E-11	4.102E-12	7.175E-13	4.266E-09	2.165E-12	3.300E-10	3.433E-11	1.872E-11	5.354E-09

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.042E-16	0.8467	4.321E-22	0.0000	9.363E-18	0.0761	8.187E-19	0.0067	2.673E-19	0.0022	7.365E-20	0.0006
Sr-90	5.872E-21	0.0000	1.216E-23	0.0000	1.301E-18	0.0106	2.628E-20	0.0002	7.801E-21	0.0001	1.365E-21	0.0000
Total	1.042E-16	0.8468	4.442E-22	0.0000	1.066E-17	0.0866	8.450E-19	0.0069	2.751E-19	0.0022	7.501E-20	0.0006

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.147E-16	0.9322								
Sr-90	6.269E-18	0.0509	4.097E-21	0.0000	6.245E-19	0.0051	6.498E-20	0.0005	3.543E-20	0.0003	8.341E-18	0.0678
Total	6.269E-18	0.0509	4.097E-21	0.0000	6.245E-19	0.0051	6.498E-20	0.0005	3.543E-20	0.0003	1.231E-16	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 BACKFILL.RAD

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil		
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.042E-16	0.8467		4.321E-22	0.0000	0.000E+00	0.0000	9.363E-18	0.0761	8.187E-19	0.0067	2.673E-19	0.0022	7.365E-20	0.0006
Sr-90	5.872E-21	0.0000		1.216E-23	0.0000	0.000E+00	0.0000	1.301E-18	0.0106	2.628E-20	0.0002	7.801E-21	0.0001	1.365E-21	0.0000
Total	1.042E-16	0.8468		4.442E-22	0.0000	0.000E+00	0.0000	1.066E-17	0.0866	8.450E-19	0.0069	2.751E-19	0.0022	7.501E-20	0.0006

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways		
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000		0.000E+00	0.0000	1.147E-16	0.9322								
Sr-90	6.269E-18	0.0509		4.097E-21	0.0000	0.000E+00	0.0000	6.245E-19	0.0051	6.498E-20	0.0005	3.543E-20	0.0003	8.341E-18	0.0678
Total	6.269E-18	0.0509		4.097E-21	0.0000	0.000E+00	0.0000	6.245E-19	0.0051	6.498E-20	0.0005	3.543E-20	0.0003	1.231E-16	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

ATTACHMENT 4

**TRENCH UNIT
RESRAD REPORT
(on CD only)**

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Summary : RESRAD Default Parameters

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current	Base	Parameter
		Value#	Case*	Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
A-1	Sr-90 (Source: FGR 12)	7.043E-04	7.043E-04	DCF1(3)
A-1	Y-90 (Source: FGR 12)	2.391E-02	2.391E-02	DCF1(4)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
B-1	Sr-90+D	1.308E-03	1.300E-03	DCF2(2)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-1	Sr-90+D	1.528E-04	1.420E-04	DCF3(2)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-34				
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(2,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(2,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(2,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(2,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(2,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : RESRAD Default Parameters

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Site-Specific Parameter Summary

Menu	Parameter	User		Used by RESRAD	Parameter
		Input	Default	(If different from user input)	Name
R011	Area of contaminated zone (m**2)	9.330E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.500E-02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Sr-90	1.380E-01	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(2)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User		Used by RESRAD	Parameter
		Input	Default	(If different from user input)	Name
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.623E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.516E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.467E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.466E-01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.466E-01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 TRENCH.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 TRENCH.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User		Used by RESRAD	Parameter
		Input	Default	(If different from user input)	Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PARCEL C SURVEY UNIT 232 TRENCH.RAD

Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area:	933.00 square meters	Cs-137	4.500E-02
Thickness:	2.00 meters	Sr-90	1.380E-01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	6.104E-01	5.933E-01	5.606E-01	4.595E-01	2.608E-01	3.657E-02	2.037E-04	8.639E-12
M(t):	2.442E-02	2.373E-02	2.242E-02	1.838E-02	1.043E-02	1.463E-03	8.148E-06	3.455E-13

Maximum TDOSE(t): 6.104E-01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	8.061E-02	0.1321	7.100E-08	0.0000	0.000E+00	0.0000	7.222E-03	0.0118	6.315E-04	0.0010	2.062E-04	0.0003	5.681E-05	0.0001
Sr-90	1.791E-03	0.0029	8.904E-06	0.0000	0.000E+00	0.0000	5.061E-01	0.8291	1.022E-02	0.0167	3.034E-03	0.0050	5.307E-04	0.0009
Total	8.240E-02	0.1350	8.975E-06	0.0000	0.000E+00	0.0000	5.133E-01	0.8410	1.085E-02	0.0178	3.240E-03	0.0053	5.876E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	8.872E-02	0.1453										
Sr-90	0.000E+00	0.0000	5.217E-01	0.8547										
Total	0.000E+00	0.0000	6.104E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.876E-02	0.1327	6.938E-08	0.0000	0.000E+00	0.0000	7.056E-03	0.0119	6.171E-04	0.0010	2.015E-04	0.0003	5.551E-05	0.0001
Sr-90	1.739E-03	0.0029	8.646E-06	0.0000	0.000E+00	0.0000	4.915E-01	0.8284	9.926E-03	0.0167	2.947E-03	0.0050	5.154E-04	0.0009
Total	8.050E-02	0.1357	8.716E-06	0.0000	0.000E+00	0.0000	4.986E-01	0.8403	1.054E-02	0.0178	3.148E-03	0.0053	5.709E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	8.670E-02	0.1461										
Sr-90	0.000E+00	0.0000	5.066E-01	0.8539										
Total	0.000E+00	0.0000	5.933E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.520E-02	0.1342	6.624E-08	0.0000	0.000E+00	0.0000	6.737E-03	0.0120	5.891E-04	0.0011	1.924E-04	0.0003	5.300E-05	0.0001
Sr-90	1.640E-03	0.0029	8.154E-06	0.0000	0.000E+00	0.0000	4.635E-01	0.8269	9.361E-03	0.0167	2.779E-03	0.0050	4.861E-04	0.0009
Total	7.684E-02	0.1371	8.220E-06	0.0000	0.000E+00	0.0000	4.702E-01	0.8389	9.950E-03	0.0177	2.971E-03	0.0053	5.391E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	8.277E-02	0.1477										
Sr-90	0.000E+00	0.0000	4.778E-01	0.8523										
Total	0.000E+00	0.0000	5.606E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.396E-02	0.1392	5.633E-08	0.0000	0.000E+00	0.0000	5.730E-03	0.0125	5.010E-04	0.0011	1.636E-04	0.0004	4.507E-05	0.0001
Sr-90	1.336E-03	0.0029	6.641E-06	0.0000	0.000E+00	0.0000	3.775E-01	0.8215	7.624E-03	0.0166	2.263E-03	0.0049	3.959E-04	0.0009
Total	6.529E-02	0.1421	6.697E-06	0.0000	0.000E+00	0.0000	3.832E-01	0.8340	8.125E-03	0.0177	2.427E-03	0.0053	4.409E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	7.040E-02	0.1532										
Sr-90	0.000E+00	0.0000	3.891E-01	0.8468										
Total	0.000E+00	0.0000	4.595E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	4.026E-02	0.1544	3.546E-08	0.0000	0.000E+00	0.0000	3.607E-03	0.0138	3.154E-04	0.0012	1.030E-04	0.0004	2.837E-05	0.0001
Sr-90	7.431E-04	0.0028	3.695E-06	0.0000	0.000E+00	0.0000	2.100E-01	0.8053	4.241E-03	0.0163	1.259E-03	0.0048	2.202E-04	0.0008
Total	4.100E-02	0.1572	3.730E-06	0.0000	0.000E+00	0.0000	2.136E-01	0.8191	4.557E-03	0.0175	1.362E-03	0.0052	2.486E-04	0.0010

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	4.431E-02	0.1699										
Sr-90	0.000E+00	0.0000	2.165E-01	0.8301										
Total	0.000E+00	0.0000	2.608E-01	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground	Inhalation		Radon		Plant		Meat		Milk		Soil		
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.968E-03	0.2179	7.019E-09	0.0000	0.000E+00	0.0000	7.139E-04	0.0195	6.243E-05	0.0017	2.038E-05	0.0006	5.616E-06	0.0002
Sr-90	9.543E-05	0.0026	4.745E-07	0.0000	0.000E+00	0.0000	2.697E-02	0.7375	5.447E-04	0.0149	1.617E-04	0.0044	2.829E-05	0.0008
Total	8.064E-03	0.2205	4.815E-07	0.0000	0.000E+00	0.0000	2.769E-02	0.7570	6.072E-04	0.0166	1.821E-04	0.0050	3.390E-05	0.0009

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water	Fish		Radon		Plant		Meat		Milk		All Pathways*		
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	8.771E-03	0.2398										
Sr-90	0.000E+00	0.0000	2.780E-02	0.7602										
Total	0.000E+00	0.0000	3.657E-02	1.0000										

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.787E-05	0.3823	6.859E-11	0.0000	0.000E+00	0.0000	6.976E-06	0.0342	6.100E-07	0.0030	1.992E-07	0.0010	5.488E-08	0.0003
Sr-90	2.711E-07	0.0013	1.348E-09	0.0000	0.000E+00	0.0000	7.661E-05	0.3761	1.547E-06	0.0076	4.593E-07	0.0023	8.034E-08	0.0004
Total	7.814E-05	0.3836	1.416E-09	0.0000	0.000E+00	0.0000	8.359E-05	0.4104	2.157E-06	0.0106	6.585E-07	0.0032	1.352E-07	0.0007

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	8.571E-05	0.4208										
Sr-90	3.578E-05	0.1757	1.815E-08	0.0001	0.000E+00	0.0000	2.767E-06	0.0136	2.875E-07	0.0014	1.569E-07	0.0008	1.180E-04	0.5792
Total	3.578E-05	0.1757	1.815E-08	0.0001	0.000E+00	0.0000	2.767E-06	0.0136	2.875E-07	0.0014	1.569E-07	0.0008	2.037E-04	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	7.183E-12	0.8315	6.327E-18	0.0000	0.000E+00	0.0000	6.435E-13	0.0745	5.627E-14	0.0065	1.838E-14	0.0021	5.062E-15	0.0006
Sr-90	3.310E-16	0.0000	1.646E-18	0.0000	0.000E+00	0.0000	9.355E-14	0.0108	1.889E-15	0.0002	5.608E-16	0.0001	9.810E-17	0.0000
Total	7.183E-12	0.8316	7.973E-18	0.0000	0.000E+00	0.0000	7.371E-13	0.0853	5.816E-14	0.0067	1.894E-14	0.0022	5.160E-15	0.0006

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.										
Cs-137	0.000E+00	0.0000	7.906E-12	0.9152										
Sr-90	5.831E-13	0.0675	2.959E-16	0.0000	0.000E+00	0.0000	4.510E-14	0.0052	4.693E-15	0.0005	2.559E-15	0.0003	7.322E-13	0.0848
Total	5.831E-13	0.0675	2.959E-16	0.0000	0.000E+00	0.0000	4.510E-14	0.0052	4.693E-15	0.0005	2.559E-15	0.0003	8.639E-12	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137+D	Cs-137+D	1.000E+00	1.972E+00	1.927E+00	1.839E+00	1.564E+00	9.848E-01	1.949E-01	1.905E-03	1.757E-10
Sr-90+D	Sr-90+D	1.000E+00	3.780E+00	3.671E+00	3.462E+00	2.820E+00	1.569E+00	2.015E-01	8.550E-04	5.306E-12

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	1.268E+01	1.298E+01	1.359E+01	1.598E+01	2.539E+01	1.283E+02	1.313E+04	1.423E+11
Sr-90	6.613E+00	6.810E+00	7.221E+00	8.866E+00	1.594E+01	1.241E+02	2.924E+04	4.712E+12

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)

and Single Radionuclide Soil Guidelines G(i,t) in pCi/g

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Cs-137	4.500E-02	0.000E+00	1.972E+00	1.268E+01	1.972E+00	1.268E+01
Sr-90	1.380E-01	0.000E+00	3.780E+00	6.613E+00	3.780E+00	6.613E+00

Summary : RESRAD Default Parameters

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Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)	DOSE(j,t), mrem/yr							
(j)	(i)		t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	Cs-137	1.000E+00	8.872E-02	8.670E-02	8.277E-02	7.040E-02	4.431E-02	8.771E-03	8.571E-05	7.906E-12
Sr-90	Sr-90	1.000E+00	5.217E-01	5.066E-01	4.778E-01	3.891E-01	2.165E-01	2.780E-02	1.180E-04	7.322E-13

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)	S(j,t), pCi/g							
(j)	(i)		t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	Cs-137	1.000E+00	4.500E-02	4.397E-02	4.198E-02	3.570E-02	2.248E-02	4.448E-03	4.347E-05	4.010E-12
Sr-90	Sr-90	1.000E+00	1.380E-01	1.340E-01	1.264E-01	1.029E-01	5.726E-02	7.355E-03	2.089E-05	2.551E-14

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 0.47 seconds

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Intrinsic : RESRAD Default Parameters

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Cancer Risk Slope Factors Summary Table

Risk Library: FGR 13 Morbidity

Menu	Parameter	Current	Base	Parameter
		Value	Case*	Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Cs-137+D	2.55E-06	5.32E-10	SLPF(1,1)
Sf-1	Sr-90+D	1.96E-08	4.82E-10	SLPF(2,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Cs-137+D	1.12E-10	1.12E-10	SLPF(1,2)
Sf-2	Sr-90+D	4.33E-10	4.25E-10	SLPF(2,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.74E-11	3.74E-11	SLPF(1,3)
Sf-3	Sr-90+D	9.53E-11	6.88E-11	SLPF(2,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.04E-11	3.04E-11	SLPF(1,4)
Sf-3	Sr-90+D	7.40E-11	5.59E-11	SLPF(2,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.74E-11	3.74E-11	SLPF(1,5)
Sf-3	Sr-90+D	9.53E-11	6.88E-11	SLPF(2,5)

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Intrinsic : RESRAD Default Parameters

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Risk Slope and Environmental Transport Factors for the Ground Pathway

Nuclide	Slope(i)*	ETFG(i,t) At Time in Years (dimensionless)							
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Ba-137m	2.690E-06	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01	5.311E-01
Cs-137	5.320E-10	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01	5.462E-01
Sr-90	4.820E-10	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01	5.483E-01
Y-90	1.910E-08	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01	5.345E-01

* - Units are 1/yr per (pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.252E-03	1.461E+02	1.278E+01	4.172E+00	1.149E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+02
Sr-90	6.905E-03	3.360E+03	6.781E+01	2.014E+01	3.525E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.452E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.316E-06	0.1636	5.455E-12	0.0000	1.182E-07	0.0147	1.034E-08	0.0013	3.375E-09	0.0004	9.298E-10	0.0001
Sr-90	2.884E-08	0.0036	5.972E-11	0.0000	6.392E-06	0.7947	1.291E-07	0.0160	3.832E-08	0.0048	6.703E-09	0.0008
Total	1.345E-06	0.1672	6.517E-11	0.0000	6.510E-06	0.8094	1.394E-07	0.0173	4.169E-08	0.0052	7.632E-09	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.449E-06	0.1801								
Sr-90	0.000E+00	0.0000	6.595E-06	0.8199								
Total	0.000E+00	0.0000	8.043E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.316E-06	0.1636	5.455E-12	0.0000	0.000E+00	0.0000	1.182E-07	0.0147	1.034E-08	0.0013	3.375E-09	0.0004	9.298E-10	0.0001
Sr-90	2.884E-08	0.0036	5.972E-11	0.0000	0.000E+00	0.0000	6.392E-06	0.7947	1.291E-07	0.0160	3.832E-08	0.0048	6.703E-09	0.0008
Total	1.345E-06	0.1672	6.517E-11	0.0000	0.000E+00	0.0000	6.510E-06	0.8094	1.394E-07	0.0173	4.169E-08	0.0052	7.632E-09	0.0009

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	1.449E-06	0.1801										
Sr-90	0.000E+00	0.0000	6.595E-06	0.8199										
Total	0.000E+00	0.0000	8.043E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.200E-03	1.428E+02	1.248E+01	4.077E+00	1.123E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.605E+02
Sr-90	6.706E-03	3.264E+03	6.592E+01	1.957E+01	3.423E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.353E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.286E-06	0.1644	5.330E-12	0.0000	1.155E-07	0.0148	1.010E-08	0.0013	3.298E-09	0.0004	9.085E-10	0.0001
Sr-90	2.801E-08	0.0036	5.799E-11	0.0000	6.207E-06	0.7938	1.254E-07	0.0160	3.721E-08	0.0048	6.509E-09	0.0008
Total	1.314E-06	0.1680	6.332E-11	0.0000	6.323E-06	0.8085	1.355E-07	0.0173	4.051E-08	0.0052	7.417E-09	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.415E-06	0.1810								
Sr-90	0.000E+00	0.0000	6.404E-06	0.8190								
Total	0.000E+00	0.0000	7.820E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.286E-06	0.1644	5.330E-12	0.0000	0.000E+00	0.0000	1.155E-07	0.0148	1.010E-08	0.0013	3.298E-09	0.0004	9.085E-10	0.0001
Sr-90	2.801E-08	0.0036	5.799E-11	0.0000	0.000E+00	0.0000	6.207E-06	0.7938	1.254E-07	0.0160	3.721E-08	0.0048	6.509E-09	0.0008
Total	1.314E-06	0.1680	6.332E-11	0.0000	0.000E+00	0.0000	6.323E-06	0.8085	1.355E-07	0.0173	4.051E-08	0.0052	7.417E-09	0.0009

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	1.415E-06	0.1810										
Sr-90	0.000E+00	0.0000	6.404E-06	0.8190										
Total	0.000E+00	0.0000	7.820E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.101E-03	1.363E+02	1.192E+01	3.892E+00	1.072E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.532E+02
Sr-90	6.324E-03	3.078E+03	6.216E+01	1.845E+01	3.228E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.162E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.228E-06	0.1661	5.089E-12	0.0000	1.103E-07	0.0149	9.643E-09	0.0013	3.149E-09	0.0004	8.674E-10	0.0001
Sr-90	2.641E-08	0.0036	5.469E-11	0.0000	5.854E-06	0.7920	1.182E-07	0.0160	3.509E-08	0.0047	6.138E-09	0.0008
Total	1.254E-06	0.1697	5.978E-11	0.0000	5.964E-06	0.8069	1.279E-07	0.0173	3.824E-08	0.0052	7.006E-09	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.351E-06	0.1829								
Sr-90	0.000E+00	0.0000	6.039E-06	0.8171								
Total	0.000E+00	0.0000	7.391E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.228E-06	0.1661	5.089E-12	0.0000	0.000E+00	0.0000	1.103E-07	0.0149	9.643E-09	0.0013	3.149E-09	0.0004	8.674E-10	0.0001
Sr-90	2.641E-08	0.0036	5.469E-11	0.0000	0.000E+00	0.0000	5.854E-06	0.7920	1.182E-07	0.0160	3.509E-08	0.0047	6.138E-09	0.0008
Total	1.254E-06	0.1697	5.978E-11	0.0000	0.000E+00	0.0000	5.964E-06	0.8069	1.279E-07	0.0173	3.824E-08	0.0052	7.006E-09	0.0009

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.351E-06	0.1829										
Sr-90	0.000E+00	0.0000	6.039E-06	0.8171										
Total	0.000E+00	0.0000	7.391E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.786E-03	1.159E+02	1.014E+01	3.310E+00	9.119E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.303E+02
Sr-90	5.150E-03	2.507E+03	5.063E+01	1.503E+01	2.629E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.575E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.044E-06	0.1720	4.328E-12	0.0000	9.378E-08	0.0155	8.201E-09	0.0014	2.678E-09	0.0004	7.377E-10	0.0001
Sr-90	2.151E-08	0.0035	4.454E-11	0.0000	4.767E-06	0.7856	9.628E-08	0.0159	2.858E-08	0.0047	4.999E-09	0.0008
Total	1.065E-06	0.1756	4.887E-11	0.0000	4.861E-06	0.8011	1.045E-07	0.0172	3.126E-08	0.0052	5.737E-09	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.149E-06	0.1894								
Sr-90	0.000E+00	0.0000	4.919E-06	0.8106								
Total	0.000E+00	0.0000	6.068E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.044E-06	0.1720	4.328E-12	0.0000	0.000E+00	0.0000	9.378E-08	0.0155	8.201E-09	0.0014	2.678E-09	0.0004	7.377E-10	0.0001
Sr-90	2.151E-08	0.0035	4.454E-11	0.0000	0.000E+00	0.0000	4.767E-06	0.7856	9.628E-08	0.0159	2.858E-08	0.0047	4.999E-09	0.0008
Total	1.065E-06	0.1756	4.887E-11	0.0000	0.000E+00	0.0000	4.861E-06	0.8011	1.045E-07	0.0172	3.126E-08	0.0052	5.737E-09	0.0009

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.149E-06	0.1894										
Sr-90	0.000E+00	0.0000	4.919E-06	0.8106										
Total	0.000E+00	0.0000	6.068E-06	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	1.125E-03	7.298E+01	6.381E+00	2.084E+00	5.740E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.202E+01
Sr-90	2.865E-03	1.395E+03	2.817E+01	8.362E+00	1.463E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.433E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	6.572E-07	0.1899	2.724E-12	0.0000	5.904E-08	0.0171	5.162E-09	0.0015	1.686E-09	0.0005	4.644E-10	0.0001
Sr-90	1.197E-08	0.0035	2.478E-11	0.0000	2.652E-06	0.7665	5.356E-08	0.0155	1.590E-08	0.0046	2.781E-09	0.0008
Total	6.691E-07	0.1934	2.750E-11	0.0000	2.711E-06	0.7836	5.873E-08	0.0170	1.759E-08	0.0051	3.246E-09	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	7.235E-07	0.2091								
Sr-90	0.000E+00	0.0000	2.737E-06	0.7909								
Total	0.000E+00	0.0000	3.460E-06	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil		
Radio-	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	6.572E-07	0.1899	2.724E-12	0.0000	0.000E+00	0.0000	5.904E-08	0.0171	5.162E-09	0.0015	1.686E-09	0.0005	4.644E-10	0.0001	
Sr-90	1.197E-08	0.0035	2.478E-11	0.0000	0.000E+00	0.0000	2.652E-06	0.7665	5.356E-08	0.0155	1.590E-08	0.0046	2.781E-09	0.0008	
Total	6.691E-07	0.1934	2.750E-11	0.0000	0.000E+00	0.0000	2.711E-06	0.7836	5.873E-08	0.0170	1.759E-08	0.0051	3.246E-09	0.0009	

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways		
Radio-	Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	7.235E-07	0.2091											
Sr-90	0.000E+00	0.0000	2.737E-06	0.7909											
Total	0.000E+00	0.0000	3.460E-06	1.0000											

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)						Water Dependent Pathways				Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.226E-04	1.444E+01	1.263E+00	4.124E-01	1.136E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.623E+01
Sr-90	3.680E-04	1.791E+02	3.618E+00	1.074E+00	1.878E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.840E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.301E-07	0.2629	5.392E-13	0.0000	1.168E-08	0.0236	1.022E-09	0.0021	3.336E-10	0.0007	9.191E-11	0.0002
Sr-90	1.537E-09	0.0031	3.183E-12	0.0000	3.406E-07	0.6886	6.879E-09	0.0139	2.042E-09	0.0041	3.572E-10	0.0007
Total	1.316E-07	0.2661	3.722E-12	0.0000	3.523E-07	0.7123	7.901E-09	0.0160	2.376E-09	0.0048	4.491E-10	0.0009

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.432E-07	0.2895								
Sr-90	0.000E+00	0.0000	3.515E-07	0.7105								
Total	0.000E+00	0.0000	4.947E-07	1.0000								

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil		
Radio-	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.301E-07	0.2629	5.392E-13	0.0000	0.000E+00	0.0000	1.168E-08	0.0236	1.022E-09	0.0021	3.336E-10	0.0007	9.191E-11	0.0002	
Sr-90	1.537E-09	0.0031	3.183E-12	0.0000	0.000E+00	0.0000	3.406E-07	0.6886	6.879E-09	0.0139	2.042E-09	0.0041	3.572E-10	0.0007	
Total		1.316E-07	0.2661	3.722E-12	0.0000	0.000E+00	0.0000	3.523E-07	0.7123	7.901E-09	0.0160	2.376E-09	0.0048	4.491E-10	0.0009

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways		
Radio-	Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	1.432E-07	0.2895											
Sr-90	0.000E+00	0.0000	3.515E-07	0.7105											
Total		0.000E+00	0.0000	4.947E-07	1.0000										

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.175E-06	1.411E-01	1.234E-02	4.030E-03	1.110E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.586E-01
Sr-90	1.045E-06	5.088E-01	1.027E-02	3.050E-03	5.335E-04	2.362E-01	1.198E-04	1.827E-02	1.898E-03	1.036E-03	7.802E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.271E-09	0.4460	5.269E-15	0.0000	1.142E-10	0.0401	9.985E-12	0.0035	3.260E-12	0.0011	8.982E-13	0.0003
Sr-90	4.366E-12	0.0015	9.039E-15	0.0000	9.675E-10	0.3395	1.954E-11	0.0069	5.800E-12	0.0020	1.015E-12	0.0004
Total	1.275E-09	0.4475	1.431E-14	0.0000	1.082E-09	0.3795	2.952E-11	0.0104	9.061E-12	0.0032	1.913E-12	0.0007

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.399E-09	0.4910								
Sr-90	4.054E-10	0.1422	2.648E-13	0.0001	4.037E-11	0.0142	4.195E-12	0.0015	2.289E-12	0.0008	1.451E-09	0.5090
Total	4.054E-10	0.1422	2.648E-13	0.0001	4.037E-11	0.0142	4.195E-12	0.0015	2.289E-12	0.0008	2.850E-09	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Cs-137	1.271E-09	0.4460	5.269E-15	0.0000	0.000E+00	0.0000	1.142E-10	0.0401	9.985E-12	0.0035	3.260E-12	0.0011	8.982E-13	0.0003
Sr-90	4.366E-12	0.0015	9.039E-15	0.0000	0.000E+00	0.0000	9.675E-10	0.3395	1.954E-11	0.0069	5.800E-12	0.0020	1.015E-12	0.0004
Total	1.275E-09	0.4475	1.431E-14	0.0000	0.000E+00	0.0000	1.082E-09	0.3795	2.952E-11	0.0104	9.061E-12	0.0032	1.913E-12	0.0007

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	Nuclide	risk	fract.	risk										
Cs-137	0.000E+00	0.0000	1.399E-09	0.4910										
Sr-90	4.054E-10	0.1422	2.648E-13	0.0001	0.000E+00	0.0000	4.037E-11	0.0142	4.195E-12	0.0015	2.289E-12	0.0008	1.451E-09	0.5090
Total	4.054E-10	0.1422	2.648E-13	0.0001	0.000E+00	0.0000	4.037E-11	0.0142	4.195E-12	0.0015	2.289E-12	0.0008	2.850E-09	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Intrinsic : RESRAD Default Parameters

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Cs-137	2.006E-13	1.302E-08	1.139E-09	3.718E-10	1.024E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.463E-08
Sr-90	1.276E-15	6.212E-10	1.255E-11	3.724E-12	6.515E-13	3.873E-09	1.965E-12	2.996E-10	3.117E-11	1.700E-11	4.861E-09

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.172E-16	0.8580	4.861E-22	0.0000	1.053E-17	0.0771	9.210E-19	0.0067	3.007E-19	0.0022	8.285E-20	0.0006
Sr-90	5.331E-21	0.0000	1.104E-23	0.0000	1.181E-18	0.0086	2.386E-20	0.0002	7.083E-21	0.0001	1.239E-21	0.0000
Total	1.173E-16	0.8580	4.971E-22	0.0000	1.171E-17	0.0857	9.449E-19	0.0069	3.078E-19	0.0023	8.409E-20	0.0006

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.								
Cs-137	0.000E+00	0.0000	1.291E-16	0.9446								
Sr-90	5.692E-18	0.0416	3.719E-21	0.0000	5.670E-19	0.0041	5.899E-20	0.0004	3.216E-20	0.0002	7.572E-18	0.0554
Total	5.692E-18	0.0416	3.719E-21	0.0000	5.670E-19	0.0041	5.899E-20	0.0004	3.216E-20	0.0002	1.367E-16	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Intrinsic : RESRAD Default Parameters

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.172E-16	0.8580	4.861E-22	0.0000	0.000E+00	0.0000	1.053E-17	0.0771	9.210E-19	0.0067	3.007E-19	0.0022	8.285E-20	0.0006
Sr-90	5.331E-21	0.0000	1.104E-23	0.0000	0.000E+00	0.0000	1.181E-18	0.0086	2.386E-20	0.0002	7.083E-21	0.0001	1.239E-21	0.0000
Total	1.173E-16	0.8580	4.971E-22	0.0000	0.000E+00	0.0000	1.171E-17	0.0857	9.449E-19	0.0069	3.078E-19	0.0023	8.409E-20	0.0006

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existental Radionuclides (i) and Pathways (p)
 and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.										
Cs-137	0.000E+00	0.0000	1.291E-16	0.9446										
Sr-90	5.692E-18	0.0416	3.719E-21	0.0000	0.000E+00	0.0000	5.670E-19	0.0041	5.899E-20	0.0004	3.216E-20	0.0002	7.572E-18	0.0554
Total	5.692E-18	0.0416	3.719E-21	0.0000	0.000E+00	0.0000	5.670E-19	0.0041	5.899E-20	0.0004	3.216E-20	0.0002	1.367E-16	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

ATTACHMENT 5
RESPONSE TO COMMENTS

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RESPONSE TO COMMENTS ON
DRAFT SURVEY UNIT PROJECT REPORTS FOR SURVEY UNITS 192, 194, 227, AND 232 (WORK PACKAGE 48)
PARCEL C STORM DRAIN AND SANITARY SEWER REMOVAL
HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

Comments from Ryan Miya, Ph.D.
Senior Hazardous Substances Scientist
San Francisco Peninsula Team Leader
Brownfields and Environmental Restoration Program – Berkeley
Department of Toxic Substances Control

Comments Dated: June 6, 2012

COMMENTS ON ALL DRAFT SUPRs	RESPONSE
Comment 1. Section 3.2 – Survey Unit. Please briefly explain why there are no pipe segment scans from the removed pipe segments (for example, a majority of pipe segments disintegrated upon removal, etc.).	Response 1. Pipe and manhole sediment sample analyses are provided in each individual SUPR when radiological contamination above the release criteria is identified. Information related to the availability of a sufficient volume of sediment for sample collection and analysis, pipe/manhole survey results, sediment sample analyses, and final disposition of the pipe/manholes will be presented in the Parcel C Radiological Removal Action Completion Report (Radiological RACR).
Comment 2. Section 3.2.1 – Trench Survey Unit. <ul style="list-style-type: none"> (a) Please provide the dates of excavation, soil sampling, and backfilling at each trench survey unit. (b) The total volume of soil remediated from each trench survey unit identified as having contamination present that exceeded the release criteria, as applicable, should be provided in the text. 	Response 2(a). The Navy will provide this information in the Parcel C Radiological RACR. Response 2(b). The Parcel C Radiological RACR will provide Table 3-4 that summarizes the elevated sample results, radionuclides of concern (if present), and estimated soil volume remediated for each excavated soil survey unit derived from excavation of the Parcel C storm drain and sanitary sewer systems.

RESPONSE TO COMMENTS ON
DRAFT SURVEY UNIT PROJECT REPORTS FOR SURVEY UNITS 192, 194, 227, AND 232 (WORK PACKAGE 48)
PARCEL C STORM DRAIN AND SANITARY SEWER REMOVAL
HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

<p>Comment 3. Section 3.2.2 – Import Fill Material. Please specify if any additional analyses on the import fill material beyond the radiological analyses were conducted in order to verify the quality of the backfill.</p>	<p>Response 3. Additional analyses for chemicals of concern were performed on the import fill material as specified in the Hunters Point Shipyard Project Backfill Review and Acceptance Procedure provided in Appendix C to the Final Parcel C Design Plan and Final Sampling and Analysis Plan – SAP Worksheet #17 – Sampling Design and Rationale. The Navy has provided this information in the Survey Unit Project Reports Abstract, Section 3.2.4.</p>
COMMENTS ON DRAFT SURVEY UNIT 194	
<p>Comment 4. Section 1.2 – Background. The text should be changed from Van Keuren “Street” to Van Keuren “Avenue”.</p>	<p>Response 4. The Navy has revised the text to state Van Keuren Avenue.</p>
<p>Comment 5. Section 3.2.2 – Excavated Soil Units. Please specify if any additional analyses on the excavated soil units beyond the radiological analyses were conducted in order to verify the quality of the backfill.</p>	<p>Response 5. The Navy conducted additional soil analyses only if the origin of the excavated soil was from an identified Installation Restoration site. If the excavated soil was not obtained from an Installation Restoration site, only radiological analyses were performed.</p>
<p>Comment 6. Sections 3.2.2.x – Excavated Soil Unit(s). The total volume of soil remediated from each excavated soil unit identified as having contamination present that exceeded the release criteria, as applicable, should be provided in the text.</p>	<p>Response 6. The Parcel C Radiological RACR will provide Table 3-4 that summarizes the elevated sample results, radionuclides of concern (if present), and estimated soil volume remediated for each excavated soil survey unit derived from excavation of the Parcel C storm drain and sanitary sewer systems.</p>

RESPONSE TO COMMENTS ON
DRAFT SURVEY UNIT PROJECT REPORTS FOR SURVEY UNITS 192, 194, 227, AND 232 (WORK PACKAGE 48)
PARCEL C STORM DRAIN AND SANITARY SEWER REMOVAL
HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

Comments from Larry Morgan
Senior Health Physicist
Environmental Management Branch (EMB)
California Department of Public Health (CDPH)

Comments Dated: June 1, 2012

GENERAL COMMENTS	RESPONSE
Comment 1. It appears the offsite laboratory is reporting their Bi-214 as Ra-226 results and then using the reporting limit established for Ra-226 which results in J flags reported for most of the 609 keV peak data. There is no reporting limit for Bi-214 and applying the Ra-226 reporting limit to the Bi-214 data seems inappropriate and may be unnecessary or misleading. And the reporting limit is for Ra-226, not for Bi-214, per the offsite laboratory summary reports. Please review and discuss this with the offsite laboratory and clarify the basis for the reporting limit.	Response 1. Comment noted. The Navy recognizes the validity of this comment. The Navy has discussed this issue and believes it will not be beneficial to change the reporting limit at this time. However, the Navy will consider modifications during the next revision to the Sampling and Analysis Plan.
Comment 2. Section 4 of the reports should include discussion of any analysis of laboratory control samples or spiked samples by the onsite lab and the offsite laboratory related to the reported results.	Response 2. Discussion of laboratory control standards and quality control for on-site and off-site analyses is covered extensively in Appendix C to the Final Parcel C Design Plan and Final Sampling and Analysis Plan – SAP Worksheet #30 – Analytical Services Table.
Comment 3. Do the onsite and offsite laboratory both have a spiked Ra-226 soil sample with known activity in the tuna can geometry that is being used for analysis and if so, where may the reader find the results for analysis of these standard or spiked laboratory control samples?	Response 3. The on-site and off-site laboratories have both analyzed a spiked ^{226}Ra sample in the past. The results were provided in Section 4.5 of the Final SUPR Abstract Revision 3. The Navy issued this document on July 7, 2011. Both laboratories currently participate in the Department of Defense Environmental Laboratory Accreditation Process, which includes spiked soil sample testing on a regular basis.
Comment 4. The end of Attachment 1 on SUPR 194 appears to incorrectly include scan data which is also present in Attachment 3.	Response 4. The Navy only provides Attachments on CD. The pdf file that was burned to the disc was reviewed and appeared to be correct.

**RESPONSE TO COMMENTS ON
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HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA**

Comment 5. EMB may need to obtain independent confirmation soil samples from the survey units covered by this work package from the Sanitary Sewer and Storm Drain Removal Project.

Response 5. Comment noted.